PLASMA SUBSTITUTES

EXCEPT THOSE DERIVED FROM HUMAN BLOOD

1940–1951

An annotated bibliography

Compiled by

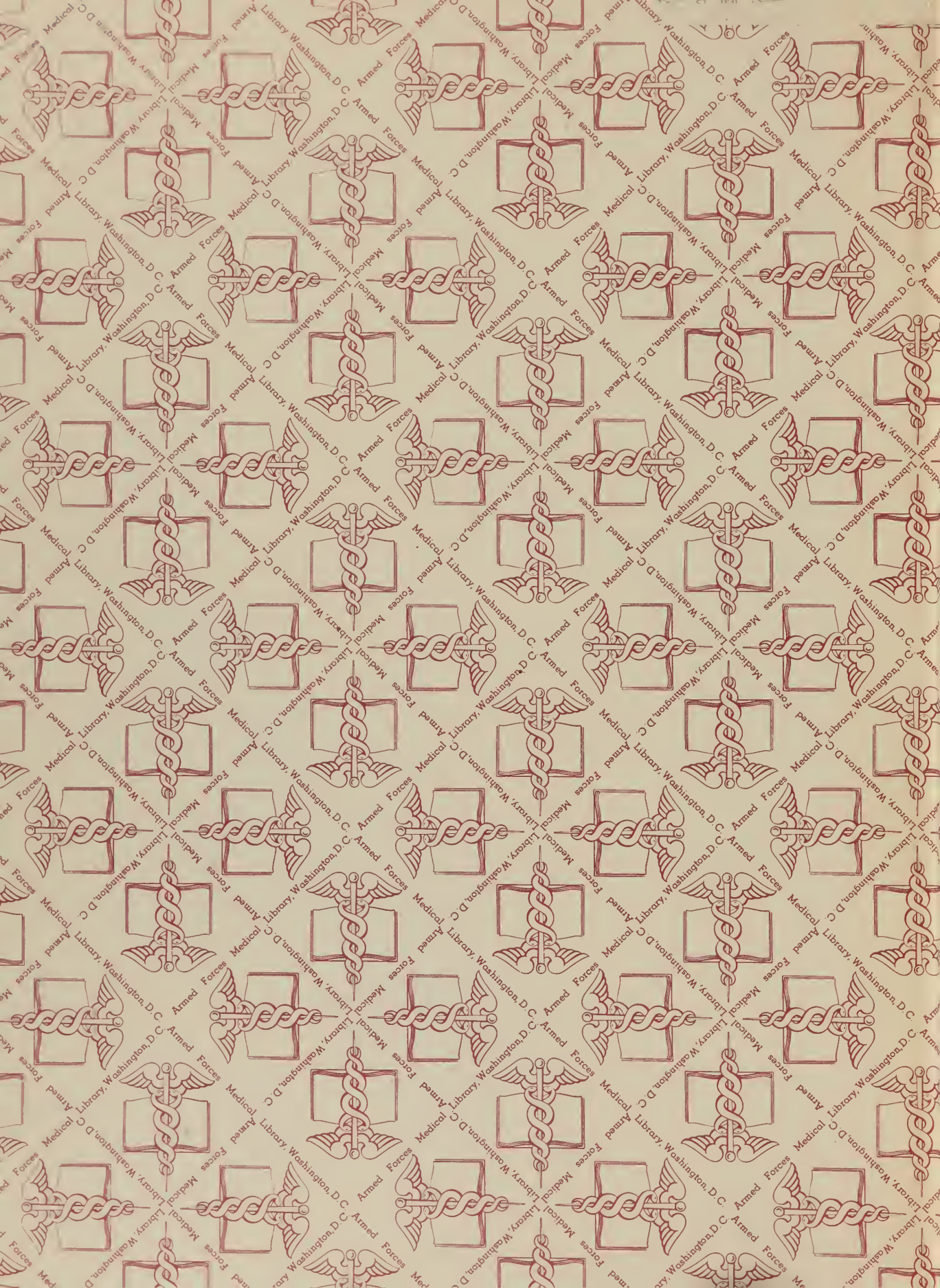
KARL A. BAER

Bibliographer

Reference Division

Washington, D. C.

December 1951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*References marked with an asterisk were not available for examination when the list was compiled. This does not necessarily mean that they are not available at Army Medical Library. Conversely, not all of the material listed without an asterisk is available at Army Medical Library.

INTRODUCTION

The compilation of this bibliography stems ultimately from the national emergency, but more immediately from the efforts of Dr. F. Douglas Lawrason of the National Research Council. Dr. Lawrason has acted as Chairman of a group of consultants which included Colonel Frederick J. Knoblauch, of the Surgeon General's Office, U. S. Army, and Dr. George H. L. Dillard, of the National Institutes of Health; these men have given freely of their time, knowledge, and energy in order to bring this project successfully to publication.

We have attempted to present here a comprehensive list of references to those plasma substitutes not derived from human blood; a closer definition of scope may be found in Dr. Lawrason's preface. The period covered by this bibliography extends from 1940 through mid-1951; an appendix contains some additional material largely culled from the abstracting and indexing journals of October and November 1951. A selective listing of background material on Burns, Hemorrhage, Infusion Therapy, and Shock, is included merely to round out the presentation and perhaps facilitate the work of the user of the bibliography.

The Army Medical Library, Library of Congress, and National Research Council possess a considerable amount of documentary material on plasma substitutes, both classified and unclassified, only a part of which is available in print. Only such documents to which easy access may be had have been listed.

The bibliography has been arranged alphabetically by subject, although it has been found expedient to list Russian and Japanese publications (Nos. 835 through 855) separately, outside the subject groups. No special search was made for abstracts, but those found during the ordinary search for material were included. The abbreviations used for titles of journals are those adopted by the Index-Catalogue of the Library of the Surgeon General's Office.

Mr. Karl A. Baer, of the Reference Division staff, has been responsible for this project; the work is largely his own. It is a pleasure to acknowledge the contribution of Mrs. Alta Jean Stewart, whose intelligent cooperation in preparing a difficult manuscript for the printer has been so valuable.

FRANK B. ROGERS
Lt. Col., MC
Director, Army Medical Library

7 December 1951

P R E F A C E

For the third time in the past thirty-five years, this country is engaged in armed conflict. Before and during World Wars I and II the medical profession directed its efforts toward meeting the needs of the combat troops of the Armed Services. The possibility of an attack on this country and its citizens was real in the initial stages of World War II, but as the Allied strength grew, the battle areas became closely defined on foreign shores. The needs of the combat troops for whole blood, plasma, or a "plasma substitute" became evident immediately and, before adequate amounts of blood or blood derivatives were available, the so-called "substitutes" were intensively investigated. However, when it became apparent that sufficient amounts of blood could be collected by the American Red Cross and the military services to meet the needs, the research directed toward the development of suitable plasma volume expanders grew less urgent. Now again, in 1951, with the rapid advances in aviation and with the advent of atomic warfare, the possibility of treating mass casualties not only in the military but also in the civilian population as a result of a sudden attack on this nation must be considered.

The treatment of shock is the single most pressing medical emergency immediately subsequent to any mass aerial attack on a city. As a rule, traumatic shock must be treated first with little delay before surgical or other possible lifesaving procedures can be instituted.

To be equipped to meet the needs of a sudden attack upon the peoples of these United States, appropriate reserves of suitable materials to treat shock must be on hand. There is little doubt that whole blood is the best intravenous solution known for this purpose. However, as of this date, whole blood has a limited storage capacity of three to four weeks; thus, it is not feasible to accumulate and sustain a large reserve of whole blood. Moreover, it is unrealistic to hope that at the hour of emergency a sufficient number of donors can be assembled, bled, and the blood carried to the scene of disaster in time to treat adequately the thousands of cases of shock. Actually, in many localities where there are large concentrations of potential blood donors, these donors may well be victims

of shock and may themselves be candidates to receive blood. Therefore, in order to establish a second line of defense to whole blood and plasma in the event of a national disaster, the medical profession has recognized the need for the development of the plasma volume expanders.

This problem is not a new one in such countries as England, France, and Germany, which were the battlefields of yesterday. In 1917 the Medical Research Committee of Britain established a Special Investigation Committee on Surgical Shock and Allied Conditions. This committee, composed of leading scientists, made comprehensive studies on the physiological alterations in shock and the use of suitable crystalloid or colloid solutions to be used for its treatment. Considerable progress was made in basic research concerned with the problem. The crystalloid solutions were extensively studied in animals subjected to experimental shock. The ready diffusability of these solutions limited their use in correcting and maintaining an adequate circulating blood volume. These experimental facts were borne out clinically. Recognizing a need for a macro-molecular substance in solution to provide the necessary intravascular osmotic effect in maintaining an adequate plasma volume, an evaluation of gum arabic, acacia, was undertaken. The investigations over the following years revealed the storage of acacia in tissues and the incidence of toxic reactions. The ability to produce a physiologically effective material, free from any early or late toxic effects on body tissues, still remains wanting after many years.

It was not until the early years of World War II that the so-called plasma substitutes again were seriously considered as part of the armamentarium in the treatment of shock. Committees were formed to examine the problem and to stimulate investigation in an effort to evaluate the therapeutic potential of macro-molecular solutions in the treatment of shock, in the event that sufficient supplies of whole blood and plasma were lacking. In the United States the advisory and coordinating committee was the Committee on Blood and Blood Substitutes of the National Research Council.

Great strides were made in the collection and preservation of whole blood, the processing of blood into plasma, the fractionation of plasma and the isolation of some of its derivatives. Because of these advances and the success of the American Red Cross blood donor program, the extensive field use of the plasma volume expanders was never

realized. Nevertheless, considerable experience in the use of gelatin solutions, pectin, etc. was accumulated. The most suitable and effective of the substitutes studied was slightly degraded gelatin made from bone.

Since the end of hostilities in 1945, the Department of Defense, the Office of Defense Mobilization, the Federal Civil Defense Administration, and other agencies of government have projected their activities to meet the continuing threat of a third war and the eventuality of a sudden national disaster. In June 1950 hostilities broke out in Korea and the need for blood and its derivatives again became acute.

In the Fall of 1950 the Subcommittee on Shock of the National Research Council was formed primarily to study the problem of the therapeutic use of plasma volume expanders in the treatment of traumatic shock. Over the past ten years several macro-molecular substances have been developed in this country and Europe. The foreign experience has been much more broad in regard to such substitutes as dextran, polyvinyl pyrrolidone, and animal plasma. Dextran was developed as a plasma volume expander in Sweden and during the past five years it has been extensively used clinically with generally good results. Likewise in Germany a synthetic polymer, polyvinyl pyrrolidone known as Periston, had wide clinical use during the war years. It was developed because the enormous demands for blood and plasma could not be met by the German Government. Favorable clinical experience with the foreign colloids still leaves much to be learned concerning the metabolic and physiologic action of these substances within the body. In addition to the previously mentioned plasma volume expanders, numerous other biologic and synthetic polymers are being investigated by the National Research Council committee.

As a result of the increased tempo of research and interest concerning the therapeutic value of the plasma volume expanders the Army Medical Library has compiled the following bibliography. An attempt has been made to make this much-needed bibliography available to all investigators at the earliest possible date. Therefore, emphasis has been placed on work accomplished over the past ten to fifteen years bringing the list of articles up to date with no attempt to review work published before 1940. The great number of published studies on crystalloids, casein derivatives, etc. in regard to their value in shock and allied conditions, have not been included. These shortcomings in

completeness result from the urgent need to make available to many investigators rapidly the results of background work with some of the newer plasma volume expanders.

Those engaged in this emergency program are indebted to the staff of the Army Medical Library, especially Mr. Karl A. Baer, for compiling this very opportune bibliography on plasma volume expanders.

F. Douglas Lawrason, M.D.

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APPENDIX

PLASMA SUBSTITUTES

EXCEPT THOSE DERIVED FROM HUMAN BLOOD

ACACIA

1. Pablo Rey, F., and Rebello, A. La goma arábiga en la preparación de inyectables; sueros gomados; condiciones que deben reunir, indicaciones terapeúticas. Rev. méd., B. Air., 1940, 2: 40-44. Preparation of various solutions of gum arabic which is considered non-toxic and useful. 9 references.

ACACIA - CHEMISTRY (incl. physiological chemistry and biochemistry)

2. Briggs, D. R. Studies in electrokinetics; the electroviscous effect: in systems of sodium gum arabic. J. Phys. Chem., 1941, 45: 866-876. 11 references.

3. Derivichian, D., and Magnant, C. Influence de la coacervation avec la gomme arabique sur l'étalement de la gélatine en couches superficielles. Bull. Soc. chim. biol., Par., 1945, 27: 101-105. Abstr.: Chem. Abstr., 1946, 40: 2055. '...When dil. solns. of acacia gum and gelatin are mixed and added to water at pH 3.5 and 40° the surface film formed covers about twice the area of that formed by same quantity of gelatin alone; hence it appears that the gum and gelatin form a coacervate complex...' (Chem. Abstr.). Paper presented at the Meeting of the Société de Chimie Biologique, July 1949.

4. Sorgdrager, P. De bepaling van arabische gom in serum. Pharm. wbl., Amst., 1947, 82: 133-135. 7 references.

ACACIA - EXPERIMENTATION

5. Buttle, G. A. H., Kekwick, A., and Schweitzer, A. Blood substitutes in treatment of acute haemorrhage. Lancet, Lond., 1940, 2: 507-510. Abstr.: Zentr. Org. ges. Chir., 1942, 105: 185. 'Plasma is the only (blood substitute) which, in the cat, consistently gives results approximate to those obtained with whole blood. The other substitute solutions we place in the following descending order of value: serum, haemoglobin-Ringer, gum-saline, red cells in crystalloid solution, isotonic saline, isotonic glucose.' 41 references.

ACACIA - EXPERIMENTATION (Continued)

6. Hall, W. K., Gibson, R. B., and Weed, L. A. Studies on the intravenous injection of colloids; effects of gum acacia on certain functions of the liver with a note on its effects on the production of immune bodies. J. Laborat. Clin. M., 1940, 26: 330-339. Damage of carbohydrate and serum metabolism functions of the liver was observed; there was, however, no effect on the hepatic cells nor any change in production of agglutinin, hemolysin, bacteriolysin and precipitin. Marked fall in fibrinogen content, and prolonged bleeding time were noted. 38 references.

7. Hoitink, A. W. J. H. Experimental experiences with the intravenous injection of gum-salt-solutions. Arch. néerl. physiol., 1940, 25: 173-201. Abstr.: Zentr. Org. ges. Chir., 1941, 103: 24-25. '...Intravenous gum injection is in my opinion not recommendable as treatment of haemorrhage... In the treatment of the acute fatal haemorrhage, the intravenous injection of saline solution is preferable. With regard to the other indications of the gum injection one will have to ask oneself, as well, if the disadvantages and risks are counterbalanced by the expected favourable action...' 34 references.

8. Hoitink, A. W. J. H. Over intraveneuse gominspuiting. Ned. tschr. geneesk., 1941, 85: 142-149. Abstr.: Zentr. Org. ges. Chir., 1941, 102: 90. 'Undesirable, detrimental and dangerous effects of the intravenous injection of arabic gum (acacia) are described... 1. a tendency to conglutination of the blood-corpuscles... 2. hypoxaemia... 3. damage to the liver and special functions of this organ; 4. dyscolloidity of the bloodplasma; while 5. the gum injection has an unfavourable influence on the recovery or the maintenance of the normal protein content of the bloodplasma...' 22 references.

9. Hueper, W. C. Experimental studies in cardiovascular pathology. V. Effects of intravenous injections of solutions of gum arabic, egg albumin and gelatin upon the blood and organs of dogs and rabbits. Am. J. Path., 1942, 18: 895-916. 'The intravenous injection of colloidal solutions of gum arabic, gelatin and ovalbumin elicits in the blood of dogs and rabbits responses which are characteristic of the "macromolecular hematological syndrome"... The development of storage phenomena in the internal organs depends upon the stability of the injected macromolecules... The agents, such as macromolecular carbohydrates (polyvinyl alcohol, pectin, methyl cellulose, gum arabic) and lipoids (cholesterol), which

ACACIA - EXPERIMENTATION (Continued)

form emulsions with proteinic solutions, give rise to foam-cellular atheromatous lesions.' 52 references.

10. Knutti, R. E., Goetsch, J. B., and Warrick, R. A. Reciprocal changes in plasma protein and plasma acacia as a result of high and low protein diets. J. Exp. M., 1950, 91: 425-431. Abstr.: Excerpta med., Sect. 2, 1951, 4: 69-70. 'The results indicate that under (certain) conditions, acacia stored in the body (principally in the liver) can be ... returned to the blood (and) that dogs in which acacia is deposited in large quantities, require a larger amount of protein in the diet to maintain a constant plasma protein content than do normal dogs.' 4 references.

11. Knutti, R. E., Warrick, R. A., and Goetsch, J. B. The maintenance of blood colloid: passage of stored gum acacia from the cells to the circulation after plasmaphoresis. J. Exp. M., 1950, 92: 77-83. 'Removal of blood plasma by plasmaphoresis from dogs made hypoproteinemic by injections of gum acacia over long periods of time, has resulted in the removal of more gum acacia than was originally present in the plasma. Gum acacia injections had been discontinued previous to the start of the experiments, and hence it must be concluded that the excess amounts of acacia were derived from deposits in the various organs.' 6 references.

12. Korth, J. Experimentelle Untersuchungen über den Einfluss verschiedener Blutkonservierungs- und Blutersatzmittel auf die Atmung und die Sauerstofftransportfunktion der menschlichen Erythrocyten. Deut. Zschr. Chir., 1944, 259: 242-252. Gum arabic and Periston 3.5 do not affect in any way the oxygen capacity and transport function of human erythrocytes. 59 references.

13. Michiels, J. Gomme arabique et barrière hémato-camérulaire. Arch. opht., Par., 1949, 9: 98. In the rabbit, the large hydrocarbon molecules of gum arabic cross the blood-aqueous barrier. Abstract of a paper presented at the Meeting of the Société Belge d'Ophthalmologie, November 1948.

14. Monke, J. V. Gum acacia and the oxygenation of red cells. Am. J. Physiol., 1941, 132: 529-534. 'Data have been presented indicating that gum acacia, when injected into the blood stream, does not retard, or in any way affect, the movement of oxygen across the plasma membrane of the red cell. This is in contradiction to observations made and recorded by other authors...' 10 references.

ACACIA - EXPERIMENTATION (Continued)

15. Mori, S. Experimentelle Beiträge zur Wiederherstellung des Bluteiweisses sowie dessen kolloid-osmotischen Drucks; Beeinflussung der Wiederherstellung des Bluteiweisses sowie dessen kolloid-osmotischen Drucks nach Plasmaphäresis durch die Beschaffenheitsveränderung der mit Erythrocyten reinfundierten Flüssigkeiten. Tohoku J. Exp. M., 1947, 49: 111-121. The effect of infusion of 6 percent solution of gum arabic into rabbits is included in the discussion (p. 117-119). 35 references.

16. Schubert, R. Verhalten wasserlöslicher Vitamine gegenüber den Serumeiweisskörpern mit besonderer Berücksichtigung des Transportproblems. Intern. Zschr. Vitaminf., 1947, 19: 119-179. Experiments with Periston and gum arabic may be interpreted to the effect that the hydration of the colloidal parts of the combining substance may play the chief part in the transport problem. Some 100 references.

17. Sloan, J. H. The use and fate of purified acacia solution in experimental hemorrhage. Current Res. Anesth., 1942, 21: 343-348. Abstr.: Chem. Abstr., 1943, 37: 2463. 'Acacia injected intravenously in the dog begins to enter the liver cells within a few hours, and is present 478 days afterwards without evidence of increased fibrosis or cellular infiltration. As an emergency measure in acute hemorrhage 6 percent acacia in 0.85 percent sodium chloride solution is effective and justifiable...' 6 references.

18. Smalley, R. E., Binger, M. W., Bollman, J. L., and Power, M. H. Effect of intravenously administered solution of acacia on animals. Arch. Int. M., 1945, 76: 39-46. Results of dog experiments 'do not contraindicate the use of acacia therapeutically under careful management.' 17 references.

ACACIA - THERAPY

19. Acacia for the nephrotic syndrome. Brit. M. J., 1941, 1: 758. Editorial discussing the work of Goudsmit and Binger, q.v. 2 references.

20. Almeida, O. de. Tratamento do choque. Rev. méd. Minas, 1940, 7: 7-19. See p. 12-14 for saline and gum acacia. 18 references.

21. Blalock, A. Shock; its prevention and treatment. Surg. Clin. N. America, 1941, 21: 1663-1683. Discussion of i.v. fluid administration includes gum acacia solutions.

ACACIA - THERAPY (Continued)

22. Bowers, W. F. Nature and the treatment of shock. Mil. Surgeon, 1941, 89: 41-48. Discussion includes the use of solution of acacia. 13 references.

23. Dérot, M. La néphrose lipoïdique et ses récents traitements. Paris méd., 1948, 38: 437-442. Includes discussion of therapy by direct action on the osmotic pressure (gum arabic, pvp).

24. Edwards, J. T. R. Problems of transfusion. Brit. M. J., 1940, 2: 535. Gum saline 'should not be discarded lightly' as a 'blood substitute'; report of a case. Letter to the editor.

25. Falkenstein, D. F., and Jackson, R. L. Acacia therapy in a child with nephrosis. J. Pediat., S. Louis, 1940, 16: 700-703. Considerable amounts of acacia were found deposited in the parenchymatous tissue 6 years after administration. 'The acacia deposited in the liver may well have interfered with serum protein regeneration.' 13 references.

26. Fantus, B. The therapy of acute peripheral circulation failure; syncope, shock and collapse. J. Am. M. Ass., 1940, 114: 2010-2015. Gum acacia (6 percent in 0.7 percent salt solution) may be used in shock when blood is not available.

27. Goudsmit, A., and Binger, M. W. Acacia in the treatment of the nephrotic syndrome. Arch. Int. Med., 1940, 66: 1252-1281. 'Of 40 successive adult patients ... all except 4 were promptly relieved of edema ... Once proper attention is given to the preparation and administration ... reactions ... are infrequent and mild.' 25 references.

28. Goudsmit, A., and Binger, M. W. Treatment of nephrotic edema. J. Am. M. Ass., 1940, 114: 2515-2517. 'The intravenous injection of solutions of acacia is now a part of the routine treatment in severe cases. A 6 percent solution of acacia in 0.06 percent sodium chloride is used with advantage... Most patients tolerate the injection without any untoward effects.' 9 references.

29. Goudsmit, A., Binger, M. W., and Power, M. H. Acacia in the treatment of the nephrotic syndrome; influence of acacia, injected intravenously, on concentration of proteins and on colloid osmotic pressure of the serum. Arch. Int. M., 1941, 68: 701-712. Report of 28 cases. 16 references.

ACACIA - THERAPY (Continued)

30. Johnson, J. B., and Newman, L. H. Intravenous injection of acacia; clinical and physiological effects on patients with nephrotic edema. Arch. Int. M., 1945, 76: 167-173. Report of 10 cases. 'No evidence ... to indicate that the injected acacia inhibited regeneration of plasma protein. No serious complications...' In one patient who died 50 days after injection storage was found, particularly in spleen and liver. 20 references.

31. Lehnhoff, H. J., Jr., and Binger, M. W. Treatment of edema of renal origin. J. Am. M. Ass., 1943, 121: 1321-1325. Includes report on 10 patients treated with gum acacia. 6 references.

32. Lyon, C. G. The treatment of shock. Pacific Coast M., 1941, 8: 24-28. Use of acacia solution and amino acids is mentioned. 28 references.

33. Maes, U., and Davis, H. A. Fluid replacement in surgical states; with particular reference to transfusion of ascitic fluid; a clinical and experimental study. Arch. Surg., 1941, 42: 453-479. Discussion includes use of gum acacia (p. 466-469). 122 references.

34. Raia, A. O tratamento do choque pelo sôro gomado. Rev. cirurg. S. Paulo, 1940, 5: 463-476. 6 percent gum acacia solution as introduced by Bayliss was used successfully in 105 cases; side effects were observed in one case only and tissue lesions did not occur. 21 references.

35. Smalley, R. E., and Binger, M. W. Chronic glomerulonephritis and the nephrotic syndrome. J. Am. M. Ass., 1944, 126: 532-535. Patients with resistant nephrotic edema who were treated with gum acacia have benefited by this treatment. 'We could not find any evidence that acacia was harmful in any way to these patients.'

ACACIA - TOXICITY, see also ACACIA - EXPERIMENTATION

36. Ammon, R. Blutersatzmittel und ihr Schicksal im Organismus unter besonderer Berücksichtigung des Peristons. Med. Mschr., 1949, 3: 16-22. Review article plus original material. In spite of the advantages of Periston, it should always be remembered that it contains a non-physiological colloid which is stored and may be harmful. Solution of gum acacia should not be used generally. 65 references.

Falkenstein, D. F., and Jackson, R. L., see No. 25.

ACACIA - TOXICITY (Continued)

Johnson, J. B., and Newman, L. H., see No. 30.

37. Mannix, E. P., Jr. Arabinosis: an exogenous macromolecular storage disease; with report of a case following the intravenous use of acacia in the treatment of the nephrotic syndrome. Brooklyn Hosp. J., 1947, 5: 200-223. 'A case of arabinosis or acacia storage disease is presented, with a review of the literature. This condition developed during treatment for chronic glomerulonephritis... The use of acacia in the treatment of surgical shock has become outmoded due to the development of excellent technics for administering plasma and whole blood. As a diuretic in the treatment of the nephrotic syndrome, its disadvantages seem to outweigh its beneficial effects. Its use, therefore, is not recommended.' 34 references.

38. Raven, R. W. Treatment of shock in war surgery. Brit. M. J., 1940, 1: 950. Objections to the use of gum acacia. Letter to the editor.

39. Schaefer, G. Indications for use of blood and blood substitutes in surgery. Surg. Clin. N. America, 1943, 23: 333-343. The author advises strongly against the use of gum acacia. 30 references.

ACACIA - VEHICLE FUNCTION, see ACACIA - EXPERIMENTATION

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40. Barsoum, H. Calf plasma for transfusion. Lancet, Lond., 1948, 1: 346-347. Animal experiments and clinical use of citrated plasma at Alexandria, Egypt.

41. Boesen, C. E., Larsen, V., and Nielsen, A. K. Properties of bovine serum heated with formaldehyde. Lancet, Lond., 1948, 1: 325-327. Animal experiments. 7 references.

42. Davis, H. A., and Eaton, A. G. Intravenous and subcutaneous administration of alkali-treated bovine serum albumin to man and lower animals. Proc. Soc. Exp. Biol., 1942, 50: 246-248. 'Alkali-treated bovine serum albumin when administered by vein or by other parenteral routes is not toxic to human beings, dogs, rabbits, guinea pigs, or mice. It possesses little or no antigenicity. It is capable of raising and maintaining the blood pressure of dogs subjected to severe hemorrhage. These facts suggest that alkali-treated bovine serum albumin may prove useful as a substitute for blood in man.' 2 references.

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43. Edwards, F. R. A form of bovine serum suitable for a plasma substitute in the treatment of shock. Proc. R. Soc. M., 1942-43, 36: 337. Preparation of the serum is described and its successful administration to 24 patients is reported. Abstract of a paper read before the Section of Surgery, March 1943.

44. Edwards, F. R. Despeciated bovine serum (D.B.S.) a substitute for human plasma. Brit. M. J., 1944, 1: 73-76. Clinical trial in 26 cases; also discusses preparation and preservation. 18 references.

45. Massons Esplugas, J. M. Calf plasma or serum for transfusion. Lancet, Lond., 1946, 2: 341-343. A method is described for the preparation of non-antigenic calf plasma which has been used successfully in hemorrhage and shock, hypoproteinemia and dehydration. 17 references.

46. Melka, J., Rapant, V., and Zapletal, B. Denatured calf plasma for transfusion. Lancet, Lond., 1947, 2: 382-383. Results of laboratory and clinical experience with D.C.P. prepared according to Masson.

47. Vaccaro, H., Staeding, J., and Pérez, J. Suero bovino desnaturalizado como substituto del plasma humano. Rev. méd. Chile, 1945, 73: 252-256. Preliminary report on chemical, biological and physiological effects of bovine serum prepared according to Edwards (with certain modifications). Discussion includes remarks by Dussert, Schepeler, Figueroa, Leiva, Eberhard and Bunster. 8 references.

ANIMAL SERUM - CHEMISTRY (incl. physiological chemistry and biochemistry)

48. Arnow, L. E., Kazal, L. A., and DeFalco, R. J. The preparation of apparently non-antigenic beef serum protein by treatment with alkali. J. Biol. Chem., 1942, 145: 347-348. The observations of Davis and Eaton (No. 42 of this bibliography) are confirmed. 2 references.

49. Bing, J. Blodsubstitutter. Nord. med., 1947, 36: 2127-2132. Abstr.: Bull. Anal. CNRS, 1949, 10: pt. 2, 1444. 'A review is given of recent advances in the production of blood substitutes with special reference to the studies on plasma proteins from the Harvard Medical School in Boston. It has not been possible to reproduce the studies on desantigenisation of bovine serum proteins by treatment with formol and heat, as done by Edwards and Masson. On the other hand it was possible

ANIMAL SERUM - CHEMISTRY (Continued)

to produce a gelatin sponge, which is of value as a resorbable hemostatic agent, and a gelatin film has made, which seems to be able to substitute fibrin-film.' 54 references.

50. DeFalco, R. J., Kazal, L. A., and Arnow, L. E. The antigenicity of protein isolated from bovine serum after brief treatment with alkali. Science, 1943, 98: 542-543. 9 references.

51. Goebel, W. F., and Perlmann, G. E. The effect of lithium periodate in crystalline bovine serum albumin. J. Exp. M., 1949, 89: 479-489. 'Prolonged contact of bovine albumin with lithium periodate destroys its ability to incite antibodies in experimental animals.' 13 references.

52. Karush, F., and Sonenberg, M. Interaction of homologous alkyl sulfates with bovine serum albumin. J. Am. Chem. Soc., 1949, 71: 1369-1376. 'The reversible binding of homologous alkyl sulfates by bovine serum has been studied ... by the method of equilibrium dialysis... Some structural implications ... have been noted.' 26 references.

ANIMAL SERUM - EXPERIMENTATION

53. Camba, R. Sull'uso del siero eterologo bovino e ovino nelle trasfusioni. Sangue, Milano, 1949, 22: 27-30. Antigenic and toxic effects of plasma denatured according to the method of Massons were observed in rabbit experiments. 8 references.

54. Frimberger, F. Ist das Trockenserum Lenggenhager's ungefährlich? Zbl. Chir., 1942, 69: 183-191. Repeated injections of Lenggenhager's 'dry' bovine serum caused serious and sometimes fatal serum shock in experimental animals. 16 references.

Goebel, W. F., and Perlmann, G. E., see No. 51.

55. Keys, A., Taylor, H. L., and Savage, G. M. Utility of animal blood in preparation of plasma for transfusion. J. Am. M. Ass., 1941, 117: 62. Report on experiments made at the University of Minnesota from 1937-1941 to test serum, plasma, plasma albumins and globulins of 8 species of animals in man.

56. Lewis, J. H. Deantigenated beef blood plasma as a possible substitute for human blood plasma. Science, 1943, 98: 371-372. The possibility of using citrated beef

ANIMAL SERUM - EXPERIMENTATION (Continued)

plasma which has been exposed to alkali for a short time, as blood substitute is suggested. Animal experiments.

57. More, R. H., Waugh, D., and Kobernick, S. D. Cardiac lesions produced in rabbits by massive injections of bovine serum gamma globulin. J. Exp. M., 1949, 89: 555-560. 'A high incidence of acute diffuse glomerulitis was produced in unilaterally nephrectomized rabbits by injection with two successive doses of purified bovine serum gamma globulin (fraction II). This experimental nephritis is morphologically analogous to human acute and subacute diffuse glomerulonephritis.' 36 references.

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58. Cordier, G., and Demirleau, J. L'utilisation du plasma ou sérum animal chez l'homme; plasma ou sérum universel détoxiqué. Presse méd., 1946, 54: 883-884. Abstr.: Excerpta med., Sect. 9, 1948, 2: 323-324. Edward's formula used in 100 patients.

59. Gatti, C. F. J. Substitutos de la sangre. Rev. san. mil., B. Air., 1946, 45: 384-389. Also in: Rev. asoc. bioquim. Argent., 1946, 13: 73-80. Abstr.: Excerpta med., Sect. 9, 1948, 2: 324. Denaturated beef serum (SDB) is recommended over gum acacia, isinglass, pectin and periston.

60. Heyl, J. T., Gibson, J. G., II., and Janeway, C. A. Studies on plasma proteins: V. Effect of concentrated solutions of human and bovine serum albumin on blood volume after acute blood loss in man. J. Clin. Invest., 1943, 22: 763-773. While concentrated human albumin is acknowledged as a safe therapeutic agent, 'no statement regarding the safety for intravenous use of crystallized bovine serum albumin ... can be made until more extensive tests have been completed.' 16 references.

61. Johnson, V., Freeman, L. W., and Longini, J. Blood. Annual Rev. Physiol., 1945, 7: 365-388. 'Bovine serum': p. 369. 8 references.

62. Lapage, G. Ox blood for blood transfusion. Nature, Lond., 1944, 153: 145. Discussion of Edwards's 'despeciated bovine serum' (D.B.S.) as outlined in Brit. M. J., 1944, 1: 73-76 (No. 44 of this list).

63. *Lenggenhager, K. Eine praktische Lösung des Blutersatzes. Zbl. Chir., 1940, 67: 1961-1967. Abstr.: Zentr. Org. ges. Chir., 1941, 101: 398-400. On the basis of chemical experience, a dried bovine serum is recommended.

ANIMAL SERUM - THERAPY (Continued)

64. *Roost, W. Erfahrungen mit anaphylaxiefreien Rinderplasma-Transfusionen. Helvet. chir. acta, 1950, 17: 298-301. Abstr.: Zentr. Org. ges. Chir., 1951, 118: 305. 28 transfusions in 13 patients were well tolerated; advantages of the procedure are pointed out.

65. Wangensteen, O. H., Hall, H., Kremen, A., and Stevens, B. Intravenous administration of bovine and human plasma to man; proof of utilization. Proc. Soc. Exp. Biol., N. Y., 1940, 43: 616-621. 'It would appear that the use of bovine plasma for the treatment of clinical states, in which contracted blood volumes or decreased protein stores are present, may have real promise. Before [it] ... can be recommended for clinical usage, however, it is important to determine ... what the limitations of the method are with reference to safety of administration.' 8 references.

66. Wepf, R. Die Verweildauer verschiedener Blutersatzmittel im Kreislauf. 35 p. Bern, 1941 (Diss.-M.D.). Abstr.: Biol. Abstr., 1945, 19, No. 704. Favorable results were obtained with Lenggenhager's dried beef serum.

ANIMAL SERUM - TOXICITY

67. Kremen, A. J., Hall, H., Koschnitzke, H. K., Stevens, B., and Wangensteen, O. H. Studies on the intravenous administration of whole bovine plasma and serum to man. Surgery, 1942, 11: 333-355. The incidence of reactions in 120 cases was sufficient to contraindicate any clinical use of whole bovine serum or plasma at the present time. A satisfactory bovine albumin from which all globulin fraction has been eliminated may prove a safe and practical 'blood substitute.' 17 references.

68. Schwiegk, H., de Niederhäusern, A., and Meinzinger, E. Über die Verwendbarkeit von artfremdem Serum als Blutersatzmittel. Klin. Wschr., 1943, 22: 391. Additional evidence is presented against the possibility of using Lenggenhager's animal serum as modified by Cassinis, de Niederhäusern and Gennaris. 5 references.

69. State, D., Torres Romero, F., Moreno Castellanos, M., and Wangensteen, O. H. Clinical evaluation of bovine serum albumin as a blood substitute. Surgery, 1947, 22: 424-441. 410 cases; 2.9 percent immediate, 9.2 percent delayed reactions. At present, not recommended. 29 references.

BEEF SERUM, see ANIMAL SERUM

BLOOD PLASMA, see PLASMA

BLOOD PROTEINS, see PLASMA PROTEINS

BLOOD SUBSTITUTES, see PLASMA SUBSTITUTES

BOVINE SERUM, see ANIMAL SERUM

BURNS (selected background material)

70. *Bucher, R. Milieubad und Alkaliplasma-Transfusion in der Behandlung der Verbrennungskrankheit. Schweiz. med. Wschr., 1950, 80: 633-635.

71. Lund, C. C., Green, R. W., and Levenson, S. M. Les brûlures. 94 p. New York, Belgian American Educational Foundation, 1945. Bibliography: p. 85-94.

72. Medical Research Council (Great Britain), War Wounds Committee. ...Studies of burns and scalds (reports of the Burns unit, Royal infirmary, Glasgow, 1942-43) ... 210 p. London, H. M. Stationery Off., 1944.

73. Miàn, E. U. Clinica e terapia delle ustioni. 150 p. Firenze, Vallecchi, 1949.

74. Motta Maia, M. C. da. Queimaduras, fisiopatologia e tratamento. 253 p. Rio de Janeiro, Casa do Livro, 1943. Chronological bibliography: p. 219-253.

75. National Research Council. Committee on Surgery. Subcommittee on Burns. Symposium on burns. Held at the request of the Committee on Medical Sciences of the Research and Development Board, National Military Establishment by the Subcommittee on Burns of the Committee on Surgery of the National Research Council. 207 p. Wash., The Council, 1951.

76. Riehl, G. Die Behandlung der Verbrennungen. Arch. Derm. Syph., Berl., 1943, 184: 86-112. In this thorough review of burn therapy, Periston is suggested as 'an excellent infusion fluid to combat toxemia.' Some 185 references.

BURNS - EXPERIMENTATION

77. Cameron, G. R., Burgess, F., and Trenwith, V. An experimental study of some effects of acute anhydraemia. J. Path. Bact., Lond., 1946, 58: 213-220. 'In an attempt to simplify the problems afforded by a thermal burn we have studied the effects produced by acute anhydraemia after the subcutaneous introduction of hypertonic solutions of glucose and sodium chloride...' 22 references.

BURNS - EXPERIMENTATION (Continued)

78. *Clark, E. J., Peters, R. A., and Rossiter, R. J. Nitrogen metabolism after burning. Q. J. Exp. Physiol., 1945, 33: 113-127.

79. Croft, P. B., and Peters, R. A. Nitrogen loss after thermal burns; effects of adding protein and methionine to diet of rats. Lancet, Lond., 1945, 1: 266-271. 38 references.

80. Harkins, H. N., and Long, C. N. H. Metabolic changes in shock after burns. Am. J. Physiol., 1945, 144: 661-668. 14 references.

81. Moyer, C. A., Coller, F. A., Iob, V., and Vaughan, H. H. Study of interrelationship of salt solutions, serum and defibrinated blood in treatment of severely scalded, anesthetized dogs. Ann. Surg., 1944, 120: 367-376.

82. Rosenthal, O., and McCarthy, M. D. Post-burn azotemia, its characteristics and relationship to the severity of thermal injury. Am. J. Physiol., 1947, 148: 365-371. 'In view of recent clinical evidence for the existence of a typical post-burn azotemia which is largely due to a rise of the undertermined plasma nitrogen, the non-protein nitrogen partition was studied in the plasma of rats subjected to standard scalds of known lethality...' 12 references.

BURNS - METABOLISM

83. Abbott, W. E., Meyer, F. L., Hirshfeld, J. W., and Griffin, G. E. Metabolic alterations following thermal burns. IV. Effect of treatment with whole blood and electrolyte solution or with plasma following experimental burn. Surgery, 1945, 17: 794-804. 26 references.

84. Abbott, W. E., Pilling, M. A., Griffin, G. E., and Hirshfeld, J. W. Metabolic alterations following thermal burns. V. Use of whole blood and electrolyte solution in treatment of burned patients. Ann. Surg., 1945, 122: 678-692. 21 references.

BURNS - TREATMENT

85. Evans, E. I. The treatment of shock in the burned patient. 11 p. No. 19 in: U. S. Army Medical Service Graduate School. Symposium on shock. 7-9 May 1951. Processed. After a discussion of mechanism and clinical picture of burn shock, P-20 osseous gelatin and dextran are considered as plasma substitutes in treatment of burn shock. They are useful, safe and effective. 13 references.

BURNS - TREATMENT (Continued)

86. Harkins, H. N. The treatment of burns. 457 p. Springfield, Ill., Thomas, 1942. Bibliography (1320 items): p. 394-440.

87. Harkins, H. N., Cope, O., Evans, E. I., Phillips, R. A., and Richards, D. W., Jr. The fluid and nutritional therapy of burns; memorandum prepared by a Committee appointed by Dr. Alfred Blalock, Chairman of the Subcommittee on shock. J. Am. M. Ass., 1945, 128: 475-479. Discussion includes intravenous administration of isoosmotic human albumin solutions and of physiologic electrolyte solutions (saline, glucose).

88. Lange, H. J., Campbell, K. N., and Coller, F. A. Present policies in the treatment of the severely burned patient; an outline of treatment including the use of whole blood transfusions. J. Michigan M. Soc., 1946, 45: 619-633. Contains a good bibliography 'reflecting recent trends in therapy and their background.' 87 references.

89. Massachusetts General Hospital, Boston. Management of the Cocoanut Grove burns at the Massachusetts General Hospital, by members of the staff, Joseph C. Aub and others. 171 p. Phila., Lippincott, 1943. Includes bibliographies.

90. Moyer, C. A. Recent advances in the chemical supportive therapy of thermal injury. Texas J. M., 1949, 45: 635-639. Treatment with whole blood, Hartmann's solution, a little plasma intravenously, and the sodium-chloride-bicarbonate solution orally is suggested for burns and many other diseases, including peritonitis, gas gangrene, fractures of the pelvis and the shaft of the femur, and the acute phases of exfoliative and bullous dermatoses. 9 references.

91. Romence, H. L. Common errors in burn treatment. Am. J. Surg., 1947, 53: 340-346. Abstr.: Zbl. Chir., 1948, 73: 188-191. Includes suggestions regarding injection of plasma, physiological salt solution and glucose.

92. Rosenqvist, H. The primary treatment of extensive burns. Acta chir. scand., 1947, 95: Suppl. 124. Also: Stockholm, Norstedt, 1947. See particularly p. 68-110, discussing the treatment of the general symptoms including intravenous replacement therapy. 'Plasma as well as dextran have been found extremely useful in counteracting burn shock.' Bibliography: p. 123-128.

BURNS - TREATMENT (Continued)

93. Virenque, J., and Sécail, J. Traitement moderne des brûlures. 62 p. Paris, 1949. Includes bibliographies.

94. Wallace, A. B. The treatment of burns. 113 p. London, Oxford Univ. Press, 1941.

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95. Bull, J. P. Dextran. In: National Research Council. Symposium on burns. 2-4 November 1950. p. 71-75. In England, plasma is used routinely while dextran serves 'as an experimental substance to check that it does correspond in results to plasma.' Antigenicity and fate in the body are discussed.

96. Dextran. Tskr. Norske laegeforen., 1950, 70: 132-133. Editorial. 'Valuable in shock therapy.'

97. Grönwall, A. Ytterligare synpunkter pa Dextran. Ugeskr. laeger, 1949, 111: 1203-1204. Discussion of various points (including nomenclature) raised by Aalkjar's paper (No.172 of this list).

98. Ingelman, B. Investigations on dextran and its application as a plasma substitute. Upsala läk. fören. förh., 1949, 54: 107-122. Abstr.: Zentr. Org. ges. Chir., 1950, 116: 176. Preparation of dextran; physiological investigations; clinical experience. Excellent review. 35 references.

99. Pessina, R. Un nuovo sostituto del plasma per transfusione, il destrano. Farmaco, Pavia, 1949, 4: 471-475. Short review article. 34 references.

100. Rosenqvist, H. Katastrofberedskap vid sjukhus. Sven. läk. tidn., 1948, 45: 1523-1528. In preparing for emergency, stockpiling of Dextran is recommended.

101. Stavely, H. E., and Toops, E. E., Jr. Hydrolysis of dextran. Fed. Proc., Balt., 1951, 10: 251. 'Dextran hydrolysates have been fractionated and the effects on rats and mice correlated with molecular size.'

102. Substitute for plasma. Am. Profes. Pharmacist, 1949, 15: 442; 465. Abstr.: Biol. Abstr., 1950, 24: 564. A description of Dextran for the pharmacist. 5 references.

103. Tarrow, A. B. Dextran, a plasma substitute; review of literature, clinical and laboratory observations. 130 p. Dallas, Tex., Baylor Univ., Aug. 1951. (Thesis-M.S. in

DEXTRAN (Continued)

Anesthesiology). History. - Physio-chemistry. - Experiments with animals. - Clinical trials in man. - Experimental studies in man.

DEXTRAN - CHEMISTRY (incl. physiological chemistry and biochemistry)

104. Anticoagulant properties of dextran. Brit. M. J., 1951. It now appears 'that it might be possible to define quantitatively the component of the raised E.S.R. which was attributable to fibrinogen, independently of the albumin and globulin concentrations.' Report of a Meeting of the Royal Society of Medicine, February 1951. 3 references.

105. Bloom, W. L., and Wilcox, M. L. Determination of dextran in blood and urine. Proc. Soc. Exp. Biol., 1951, 76: 3-4. Method and results. 7 references.

106. Bonnel, P. H. Emploi du dextran pour la recherche des anticorps Rh univalents. Rev. hémat., 1951, 6: 94-100. The dextran test should take its place among other analytical and titration methods used in the discovery of incomplete Rh antibodies. 11 references.

107. Evans, T. H., and Hibbert, H. Bacterial polysaccharides. In: Advances in carbohydrate chemistry, ed. by W. W. Pigman and M. L. Wolfrom. v. 2. New York, 1946. p. 204-233. Chapter 3 (p. 209-219) discusses dextran: History. - Structure. - Immunological properties. - Enzymatic synthesis. - Industrial significance of Dextran produced by Leuconostoc species. - Medical application. 113 references.

108. Gaines, S., and Stahly, G. L. The growth requirements of leuconostoc mesenteroides and preliminary studies on its use as an assay agent for several members of the vitamin B complex. J. Bact., Balt., 1943, 46: 441-449. 'Using a medium in which all constituents except casein hydrolysate were chemically defined, it was found that thiamin, calcium pantothenate, and nicotinic acid were essential for the growth of Leuconostoc mesenteroides 535 and that pyridoxin exerted a stimulatory effect. Although growth resulted in the absence of added biotin, employment of the avidin inactivation technic demonstrated the biotin requirement of this organism...' 7 references.

109. *Grönwall, A., and Ingelman, B. Infusion and injection fluids. U. S. Pat. No. 2,437,518, March 9, 1948. Abstr.:

DEXTRAN - CHEMISTRY (Continued)

Chem. Abstr., 1948, 42: 43311f, q.v. Preparation of blood-substitutes by acid hydrolysis of water-soluble polysaccharides (dextran, levulan, galactan).

110. Grönwall, A., and Ingelman, B. Untersuchungen über Dextran und sein Verhalten bei parenteraler Zufuhr. I. Chemische und physikalisch-chemische Untersuchungen über Dextran. Acta physiol. scand., 1944, 7-8: 97-107. Preparation of dextran, physicochemical and chemical experiments with this compound which is suggested as a therapeutic substitute for normal serum protein. 27 references.

111. Grönwall, A., and Ingelman, B. Untersuchungen über Dextran und sein Verhalten bei parenteraler Zufuhr. II. Physiologische Untersuchungen. Acta physiol. scand., 1945, 9: 1-27. Application of dextran as blood substitute. - Experiments with non-hydrolised dextran. - Preparation of partially hydrolised dextran. - Importance of molecular weight for applicability of dextran. - Methods of determining dextran in blood and urine. - Dextran in blood and urine after intravenous injection. - Influence on sedimentation rate. - The colloidal pressure of the hydrolysate. - Effect of partially hydrolised dextran in experimental shock. - Preparatory clinical tests. 22 references.

112. Grönwall, A., Ingelman, B., and Moismann, H. A dextran sulphuric acid ester with heparin activity. (Including measurements of the sedimentation and diffusion of heparin). Upsala läk. fören. förh., 1944-45, 50: 397-404. Abstr.: Chem. Abstr., 1947, 41: 5213f. 'A sulphuric acid ester of partially hydrolysed dextran is described which is remarkable for its high coagulation-inhibiting power. The physiological properties of the substance have been examined.'

113. *Grubb, R. Dextran as a medium for the demonstration of incomplete anti-Rh-agglutinins; preliminary report. J. Clin. Path., Lond., 1949, 2: 223-224.

114. Hardwicke, J., Ricketts, C. R., and Squire, J. R. Effect of dextran of various molecular sizes on erythrocyte sedimentation rate. Nature, Lond., 1950, 166: 988-989. 9 references.

115. Hassid, W. Z., and Barker, H. A. The structure of dextran synthesized from sucrose by Betacoccus arabinosaceus, Orla-Jensen. J. Biol. Chem., 1940, 134: 163-170. Abstr.: Biol. Abstr., 1940, 14: 12372. 11 references.

DEXTRAN - CHEMISTRY (Continued)

116. Hehre, E. J. The biological synthesis of polysaccharides. Tr. N. Y. Acad. Sc., 1948, 10: 188-198. 'Dextrans and levans and their formation from sucrose by bacterin.' 38 references.

117. Hehre, E. J. Comparison of dextran synthesis by leuconostoc enzyme with starch synthesis by potato phosphorylase. Proc. Soc. Exp. Biol., N. Y., 1943, 54: 240-241. Abstr.: Biol. Abstr., 1944, 18: 662. '...Comparison with starch synthesis by potato phosphorylase indicates that dextran synthesis from sucrose by leuconostoc enzyme does not require the mediation of any phosphorylated sugar.' 10 references.

118. Hehre, E. J. Production from sucrose of a serologically reactive polysaccharide by a sterile bacterial extract. Science, 1941, 93: 237-238. 'This report deals with the production from sucrose of a serologically reactive polysaccharide by an enzyme or some similar heat labile principle contained in sterile filtered extracts prepared from cultures of Leuconostoc mesenteroides...' 6 references.

119. Hehre, E. J. Studies on the enzymatic synthesis of dextran from sucrose. J. Biol. Chem., 1946, 163: 221-223. Abstr.: Biol. Abstr., 1946, 20: No. 15623; Chem. Abstr., 1946, 40: 4754. An enzyme obtained from Leuconostoc mesenteroides by a new method yielding more than 20 times more potent preparations than obtained previously was used as a catalyst in the synthesis of dextran. 34 references.

120. Hehre, E. J., and Neill, J. M. Formation of serologically reactive dextrans by streptococci from subacute bacterial endocarditis. J. Exp. M., 1946, 83: 147-162. 'Serologically reactive dextrans were synthesized from sucrose by 22 of 48 strains of streptococci isolated from the blood of patients...' 33 references.

121. Hehre, E. J., and Sugg, J. Y. Serologically reactive polysaccharides produced through the action of bacterial enzymes. I. Dextran of Leuconostoc mesenteroides from sucrose. J. Exp. M., 1942, 75: 339-353. 15 references.

122. Hint, H. C., and Thorsén, G. A micro method for determination of dextran in blood. Acta chem. scand., 1947, 1: 800-812. '...Using 0.2-2.0 ml of fluid to be analyzed, concentrations from 0.025-2.5 percent of dextran in body fluids, urine excluded, can be determined with sufficient accuracy for clinical purposes' by the micromethod described. 6 references.

DEXTRAN - CHEMISTRY (Continued)

123. Hucker, G. J., and Pederson, C. S. A review of the microbiology of commercial sugar and related sweetening agents. Food Res., 1942, 7: 459-480. Review article. 'Leuconostoc and related types': p. 460-463. Some 170 references.

124. Ingelman, B. Enzymatic breakdown of dextran. Acta chem. Scand., 1948, 2: 803-812. 'An enzyme extract has been prepared from cultures of the bacterium Cellvibrio fulva. This enzyme is capable of breaking down the polysaccharide dextran. The breakdown has been studied mainly by means of viscosity measurements. The experiments indicate that during the first stage of the breakdown the enzyme chiefly splits the dextran into comparatively large fragments. Glucose or disaccharides originating from the ends of the molecules do not seem to be formed during this phase. The optimum pH of the enzyme has been determined to be pH 5.2-5.3.' 20 references.

125. *Ingelman, B. Några resultat av sockerundersökningar i Uppsala. I. Socker, 1945, 1: 179.

126. *Ingelman, B., and Halling, M. S. Some physiochemical experiments on fractions of dextran. Arkiv Kemi, 1949, 1: 61-80. Abstr.: Chem. Abstr., 1949, 43: 6886.

127. Ingelman, B., and Siegbahn, K. An electron-microscopic study of dextran-molecules; preliminary note. Arkiv Kemi, 1944, 18: B (no. 1), 1-6. Observations based on 3 microphotographs using the electron microscope of the Research Institute for Physics in Stockholm which permits electronoptical enlargements up to 16,000 times. 10 references.

128. Ingelman, B., and Siegbahn, K. Dextran and levan molecules studied with the electron microscope. Nature, Lond., 1944, 154: 237-238. Electron microscope photographs of dextran and levan molecules are presented.

129. *Ingelman, B., and Tiselius, A. Några nya resultat av de kolloidkemiska saftundersökningarna. Dextran och kristallisationsstudier. Förh. Svensk. Sockerfabriksdir. Fören. sammantr., Uppsala, 1944. II.

130. Jeanes, A., Schieltz, N. C., and Wilham, C. A. Molecular association in dextran and in branched amylaceous carbohydrates. J. Biol. Chem., 1948, 176: 617-627. 'Orderly molecular association has been demonstrated by x-ray analysis in branched chain polysaccharides including water-soluble dextran from Leuconostoc mesenteroides NRRL B-512, corn amylopectin, and glutinous corn-starch.' 27 references.

DEXTRAN - CHEMISTRY (Continued)

131. Jones, A. R. Dextran as a diluent for univalent antibodies. Nature, Lond., 1950, 165: 118. Dextran has been tested with satisfactory results to serve as 'a suspension medium in the (antigen + univalent antibody) reacting system... A serious disadvantage of this substance is its lack of latitude as regards optimum concentration.' 3 references.

132. Kent, P. W. Periodate oxidation in the study of the structure of dextrans. Science, 1949, 110: 689-690. 7 references.

133. Klevas, S. Bestimmung des Dextrans im Blut bei seiner Anwendung als Plasmasubstitut. Svensk kem. tidskr., 1944, 56: 262-267. 'In order to follow the concentration of dextran as a plasmasubstitute in the blood, there has been examined a quantitative method of analysis ... founded upon the strong acids to cleave glucanes in a hydrolytical way into glucose. The glucose is evaluated according to a modification of Hagedorn-Jensens method of determing blood sugar.' 6 references.

134. Levi, I., Hawkins, W. L., and Hibbert, H. Studies on reactions relating to carbohydrates and polysaccharides. LXV. An improved technique for the fractionation of partially methylated glucosides. J. Am. Chem. Soc., 1942, 64: 1957-1959. Description of the method employed by the authors in an investigation of the structure of dextran (No. 135 of this list).

135. Levi, I., Hawkins, W. L., and Hibbert, H. Studies on reactions relating to carbohydrates and polysaccharides. LXVI. Structure of the dextran synthesized by the action of Leuconostoc mesenteroides on sucrose. J. Am. Chem. Soc., 1942, 64: 1959-1962. 'The complete methylation of the dextran, synthesized by Leuconostoc mesenteroides, has been accomplished in an over-all yield of 71.4 percent. Hydrolysis of trimethyl dextran and fractionation of the resulting glucoside mixture, employing quantitative technique, have established the ratio of tetra- to tri- to dimethyl methyl glucoside as 1:3:1. The three glucosides have been identified, and based on these results a tentative formula for the structure of dextran has been proposed.' 14 references.

136. [Lockwood, A. R.] Production of dextran plasma substitutes. Manufact. Chem., 1951, 22: No. 2, 58. Report on a paper read by Mr. Lockwood before a 'recent' Meeting of the Birmingham Section of the Society of Chemical Industry.

DEXTRAN - CHEMISTRY (Continued)

137. Lockwood, A. R., James, A. E., and Pautard, F. G. Studies on the breakdown product of Dextran formed by ultrasonic vibration. Research, 1951, 4: 46-48. 'Selected fractions of ultrasonically degraded dextran were neutral in aqueous solution and were protein free. They did not cause anaphylaxis on injection into guinea-pigs and were non-toxic and non-immunogenic in rabbits.' 2 references.

138. Owen, W. L. The production of gum dextran; industrial possibilities of utilizing raw sugar in a fermentation process. Sugar, 1948, 42: 28-29. Abstr.: Chem. Abstr., 1948, 42: 8004. The low cost of dextran produced by Owen's process is stressed. 11 references.

139. *Owen, W. L., Jr., and Owen, W. L. Production of gum dextran. U. S. Pat. No. 2,392,258, January 1, 1946. Abstr.: Chem. Abstr., 1946, 40: 1277, q.v.

140. *Pharmacia Aktiebolaget. Partly depolymerized dextran. Brit. Pat. No. 583,378, 17 December 1946. Abstr.: Chem. Abstr., 1947, 41: 2540, q.v.

141. Renfrew, A. G., and Cretcher, L. H. Partially hydrolyzed dextran. J. Am. Pharm. Ass., 1949, 38: 177-179. 'Partial hydrolysis of dextran has been studied by autoclaving solutions of various concentrations in the presence of water or dilute hydrochloric acid. Viscosities of hydrolyzates are reported. Relative viscosities are reported for some recovered partially hydrolyzed dextrans. Sterilization by autoclaving for thirty minutes caused no measurable change in the relative viscosities of 5 percent solutions of partially hydrolyzed dextrans.'

142. Ricketts, C. R., Lorenz, L., and Maycock, W. d'A. Molecular composition of dextran solutions for intravenous use. Nature, Lond., 1950, 165: 770-771. '...The effectiveness of dextran as a plasma substitute, as judged by the excretion of this substance in the urine in the first 24-48 hr., can be improved by: (1) the application of fractionation procedures aimed at removing low molecular-weight dextran; or (2) by variation of the degradation process. Of these the former is preferable, because it can be adjusted to yield a smaller range of molecular size...'

143. Snell, E. E., and Mitchell, H. K. Purine and pyrimidine bases as growth substances for lactic acid bacteria. Proc. Nat. Acad. Sc. U. S., 1941, 27: 1-7. Includes discussion of purine and pyrimidine bases as growth factors for Leuconostoc mesenteroides.

DEXTRAN - CHEMISTRY (Continued)

144. Stacey, M. Degradation of Dextran by ultrasonic waves. Research, 1951, 4: 48. 3 references.

145. Stacey, M. Enzymatic production of bacterial polysaccharides. Nature, Lond., 1942, 149: 639. Abstr.: Chem. Abstr., 1942, 36: 52048. Production of a mucoid water-insoluble dextran based on symbiotic culture of Leuconostoc mesenteroides and Saccharomyces cerevisiae. 9 references.

146. Stacey, M., and Swift, G. Structure of the dextran synthesised from sucrose by a new strain of Betacoccus arabinosaceous. J. Chem. Soc., Lond., pt. 2: 1555-1559. 'A water-soluble gum-like dextran has been synthesised from sucrose by a new strain of Betacoccus arabinosaceous (Leuconostoc mesenteroides). The hydrolysis products of the methylated dextran were separated chromatographically and shown to consist of 2: 3: 4: 6-tetramethyl glucose (1 part), 2: 3: 4-trimethyl glucose (3 parts), and 2: 3-dimethyl glucose (1 part). The structure of the repeating unit is thus identical with that described by previous investigators for the dextran from another strain of L. mesenteroides. The molecule in these dextrans shows an unusually high degree of branching.'

147. Stahly, G. L. Dextran. U. S. Pat. No. 2,310,263, February 9, 1943. Abstr.: Chem. Abstr., 1943, 37: 4272, q.v.

148. Stahly, G. L., and Carlson, W. W. Ethers, mixed ethers, esters, mixed esters and mixed ether-ester derivatives of dextran. U. S. Pat. No. 2,203,702, June 11, 1940. Abstr.: Chem. Abstr., 1940, 34: 6844, q.v.

149. Sugg, J. Y., and Hehre, E. J. Reactions of dextrans of leuconostoc mesenteroides with the antiserums of leuconostoc and of types 2, 20 and 12 pneumococcus. J. Immun., Balt., 1942, 43: 119-128. 'The serological properties of these dextrans are of particular interest because they represent substances whose production is dependent upon the presence of a particular carbohydrate (sucrose) in the culture medium. The dextrans from both strains reacted not only with the leuconostoc antiserums but also with types 2, 20 and 12 antipneumococcal sera.' 15 references.

150. Sugg, J. Y., Hehre, E. J., and Neill, J. M. Serologically similar polysaccharides produced from sucrose by certain streptococci and by Leuconostoc mesenteroides. J. Bact., Balt., 1942, 43: 24-25. Abstract of a paper presented at the 43rd Annual Meeting of the Society of American Bacteriologists, December 1941.

DEXTRAN - CHEMISTRY (Continued)

151. Swanson, M. A. Structure of polysaccharides. II. Degradation of polysaccharides by enzymes. J. Biol. Chem. 1948, 172: 805-814. Abstr.: Chem. Abstr., 1948, 42: 3441. 'No evidence has been obtained that any of these enzymes [muscle phosphorylase, potato phosphorylase, α- and B-amylase] can break the α-1, 6 linkages at the branch point. They do not act on dextran, a polysaccharide consisting of α-1, 6 linkages.' 8 references.

152. Swanson, M. A. Structure of polysaccharides. IV. Relation of the iodine color to the structure. J. Biol. Chem., 1948, 172: 825-837. Abstr.: Chem. Abstr., 1948, 42: 3441-3442.

153. Swanson, M. A., and Cori, C. F. Structure of polysaccharides. I. Acid hydrolysis of starchlike polysaccharides. J. Biol. Chem., 1948, 172: 797-804. Abstr.: Chem. Abstr., 1948, 42: 3439-3441. 14 references.

154. Swanson, M. A., and Cori, C. F. Structure of polysaccharides. III. Relation of structure to activation of phosphorylases. J. Biol. Chem., 1948, 172: 815-824. Abstr.: Chem. Abstr., 1948, 42: 3441.

155. Whiteside-Carlson, V., and Carlson, W. W. Studies of the effect of para-aminobenzoic acid, folic acid, and sulfanilamide on dextran synthesis by leuconostoc. J. Bact., Balt., 1949, 58: 143-149. 'The stimulating effect of raw cane sugar on growth and dextran synthesis could not be duplicated by p-aminobenzoic acid, folic acid, or a mixture of nine B vitamins.' 8 references.

156. Youngner, J. S., and Nungester, W. J. The effect of type III pneumococcus polysaccharide and gelatin on the circulation and sedimentation rate of erythrocytes in mice. J. Infect. Dis., 1944, 74-75: 247-253. 'The intravenous injection of type III pneumococcus polysaccharide or isoelectric gelatin solutions into anaesthetized mice produced ... slowing and irregularity of blood cell flow ... (and) increases in the sedimentation rate...' 22 references.

DEXTRAN - EXPERIMENTATION

157. Evans, T. H., Hawkins, W. L., and Hibbert, H. Studies on reactions relating to carbohydrates and polysaccharides; antigenicity of dextran produced by leuconostoc mesenteroides. J. Exp. M., 1941, 74: 511-518. 'Anti-Leuconostoc mesenteroides sera have been produced in rabbits. These antisera gave precipitin reactions with relatively high dilutions of the homologous polysaccharide, dextran,

DEXTRAN - EXPERIMENTATION (Continued)

having a maximum nitrogen content of 0.08 percent. It can therefore be concluded that this dextran is a haptene.' 10 references.

158. Goldenberg, M., Crane, R. D., and Popper, H. Effect of intravenous administration of dextran, a macromolecular carbohydrate, in animals. Am. J. Clin. Path., 1947, 17: 939-948. Abstr.: Chem. Abstr., 1948, 42: 2024; Bull. Anal. CNRS, 1948, 9: pt.2,1935. 'Judged from these animal experiments, Dextran may represent a good plasma substitute and should be subjected to clinical tests in human patients.' 19 references.

159. Grönwall, A., and Ingelman, B. Några nya kolloidlösningar for infusionsändamål. Nord. med., 1944, 21: 247-249. A preliminary report on dextran: Comparison with periston, therapeutic experiments. 9 references.

160. Haurowitz, F., Tunca, M., and Schwerin, P. On the failure of azo-gelatin as an antigen. Biochem. J., Lond., 1943, 37: 249-250. 'While an intravenous injection of arsanil-azo-globulin into rabbits gives rise to a considerable deposition of arsenic in the liver, an analogous injection of arsanil-azo-gelatin is followed by rapid urinary excretion of arsenic, and only small quantities of arsenic are deposited in the liver...' 6 references.

161. Hehre, E. J., and Sugg, J. Y. Serological reactivity of dextran plasma substitute. Fed. Proc., Balt., 1950, 9: 383. Animal experiments. 'Intravenous administrations of large amounts of dextran into many people without untoward reactions have been reported. Nevertheless, the antibody-combining properties of dextrans should be recognized as a theoretical source of danger in the case of persons who might possess a high titer of appropriate antibodies at the time of injection.' Abstract of a paper read at the 34th Annual Meeting of the American Association of Immunologists, April 1950.

162. Hildebrandt, F. Untersuchungen über Dextran als Blutflüssigkeitsersatz. Ärztl. Wschr., 1950, 5: 141-143. After a short review of the literature, the author reports his own dog experiments and comes to the conclusion that Dextran is an 'excellent blood plasma substitute.' 13 references.

163. Morrison, J. L., Bloom, W. L., and Richardson, A. P. Effect of dextran on the rat. J. Pharm. Exp. Ther., 1951, 101: 27-28. 'Marked edema on the feet, jowls and nose... The animals scratch themselves excessively and respiratory difficulty occurs...' Abstract of a paper read at

DEXTRAN - EXPERIMENTATION (Continued)

the Fall Meeting of the American Society for Pharmacology and Experimental Therapeutics in Boston, November 1950.

164. Nelson, A. A., and Lusky, L. M. Pathological changes in rabbits from repeated intravenous injections of periston (polyvinylpyrrolidone) or dextran. Proc. Soc. Exp. Biol., 1951, 76: 765-767. In the periston rabbits, an average enlargement of the spleen by about 70 percent and foam cell storage of periston or some near derivative were observed. Certain other and minor lesions were caused by periston and dextran. 5 references.

165. Schmitz, H. Über das Schicksal des Macrodex im Organismus; vorläufige Mitteilung. Klin. Wschr., 1951, 29: 424-425. Metabolism study based on experiments with rat tissue. 5 references.

166. Thorsén, G. Dextran; nyare undersökningar över preparatets egenskaper. Nord. med., 1948, 40: 2374. Abstr.: Bull. Anal. CNRS, 1950, 11:pt2,696. Reactions observed after transfusion (lumbar pain, asthma, hypoproteinemia, etc.) in 5 cases. Animal experimentation proved overdoses of dextran not to be deleterious.

167. Thorsén, G. Influence of Dextran Ph on tensile strength of healing wounds. Acta chir. scand., 1950, 100: 422-433. 'The drop in the concentrations of plasma protein and blood cells occurring after infusion of Dextran in doses corresponding to those used therapeutically does not lower the tensile strength of healing wounds in rabbits.' 49 references.

168. Turner, F. P., Butler, B. C., Smith, M. E., and Scudder, J. Dextran; an experimental plasma substitute. Surg. Gyn. Obst., 1949, 88: 661-675. 'Thirty volunteer patients at the Presbyterian Hospital were given infusions of macrose, a 6 percent solution of partially hydrolyzed dextran... Ten of these patients had reactions of either anaphylactic or anaphylactoid nature. A striking increase in sedimentation rate was noted in all. These reactions are believed to be specifically related to the molecular structure of the dextran molecule and its concentration in the plasma... No great changes in the levels of the various blood electrolytes were found... Satisfactory hemodilution and increase in plasma volume were noted after macrose... Plasma proteins regenerated rapidly following exsanguination and replacement of the blood loss with macrose solution. Autopsy studies on 6 dogs who received macrose ... in large quantities revealed focal degenerative lesions in the livers and kidneys, and minimal reticuloendothelial hyperplasia in the spleens.' 40 references.

DEXTRAN - EXPERIMENTATION (Continued)

169. Van den Heuvel, G. Dextran as plasma substitute and blood-pressure homeostasis. J. Physiol., Lond., 1950, 3: 15P-16P. Dog experiments. Abstract of a paper read at a Meeting of the Physiological Society, December 1949.

170. Van den Heuvel, G., and Heymans, C. Le dextran, succédané du plasma sanguin et homéostasie de la pression artérille. Arch. internat. pharm. dyn., Par., 1950, 83: 308-318. Abstr.: Chem. Abstr., 1950, 44: 10140. In dog experiments, dextran-infusions restored not only arterial pressure and respiration after bleeding and prolonged circulatory collapse, but also the physiological mechanisms of blood pressure homeostasis. 32 references.

171. Voorhees, A. B., Baker, H. J., and Pulaski, E. J. Reactions of albino rats to injections of dextran. Proc. Soc. Exp. Biol., 1951, 76: 254-256. 'Albino rats give a demonstrable reaction of redness, swelling of loose tissue, pruritis and stupor when injected with doses of Dextran comparable to recommended doses for humans.' 5 references.

DEXTRAN - THERAPY, see also DEXTRAN - VEHICLE FUNCTION

172. Aalkjaer, V. Dextran. Et nyt højmolekylaert, proteinfrit praeparat til infusion ved shock, proteinmangeltilstande og akut anaemi. Ugeskr. laeger, 1949, 111-134: 929-933. Abstr.: Excerpta med., Sect. 9, 1950, 4: 622-623. Dextran (described in great detail) is preferable to blood in shock while, in protein deficiency, amino acids are more effective. Report of 300 dextran infusions. 8 references.

173. *Bang-Rasmussen, K. Erfaringer med Dextran: Shockterapi og -profylaxe. Nord. med., 1948, 40: 2381.

174. Blood substitutes, with special reference to dextran. J. Am. Osteopath. Ass., 1951, 50: 311. Editorial. 6 references.

175. Bohmansson, G. Clinical experiences with dextran. Bull. internat. Serv. santé, Liége, 1949, 22: 1-3. Abstr.: Excerpta med., Sect. 9, 1949, 3: 1368. Dextran is suggested as preventive and therapeutic agent in shock. It should be administered in large doses, up to 4-5 liters in shock and at least 0.8 liter in prophylaxis. 'In emergency and war conditions Dextran seems to be of vital significance as it may be stored without inconvenience...'

176. Bohmansson, G. Dextran as substitute for plasma. Tr. Meet. North. Surg. Ass., Stockholm, 1947, 23: 129-132.

DEXTRAN - THERAPY (Continued)

Abstr.: Excerpta med., Sect. 9, 1949, 3: 736. 'Dextran is a full-good substitute for plasma both in the treatment of and as preventive against shock ... it should be given in large doses: for prophylaxis not under 700 milliliters, for manifest shock up to as much as 4-5 liters ... (it) should be of great value in catastrophe outfits and during war conditions, as it may readily be stored... Dextran can not take the place of blood or plasma in cases of chronic albumin marasmus or anemia.'

177. Bohmansson, G. Dextranets värde som plasmasubstitut. Nord. med., 1946, 29: 344. Conclusions based on clinical experience. Abstract of a paper presented at the Meeting of the Svensk Kirurgisk Förening, November 1945.

178. Bohmansson, G. Kliniska erfarenheter med dextran; dextranets värde som plasma substitut. Nord. med., 1946, 29: 344-345. Abstract of a paper read at the Meeting of the Svensk föreningens för invärtes Medicin, November 1945.

179. Bohmansson, G., Rosenqvist, H., Thorsén, G., and Wilander, O. Clinical experiences with dextran as a plasma substitute. Acta chir. scand., 1946, 94: 149-167. Detailed studies on metabolism and toxicology. English, German and French summaries. Presented before the Swedish Association of Surgeons, November 1944. 4 references

180. *Bohmansson, G., Thorsén, G., and Wilander, O. Dextran as a plasma substitute. J. internat. chir., Brux., 1948, 8: 890.

181. Bohn, H. Tidigare insatt chockbehandling. Svensk. läkartid., 1948, 45: 2347-2355. Dextran is recommended as a useful, practical and non-toxic bloodsubstitute. Its application in several hospitals was entirely successful over a period of 5 years.

182. Boué, A., and Huguenard, P. Un nouveau succédané du plasma; le dextran. Anesthésie, Par., 1950, 7: 423-430. Dextran is recommended as a plasma substitute with two reservations concerning its varying molecular weight and the lack of knowledge regarding its metabolic effect. 11 references.

183. Bull, J. P., Ricketts, C., Squire, J. R., Maycock, W. d'A., Spooner, S. J. L., Mollison, P. L., and Paterson, J. C. S. Dextran as a plasma substitute. Lancet, Lond., 1949, 1: 134-143. Requirements of a plasma substitute. - Chemistry of dextran as prepared for infusion.- Experimental observations. - Clinical trials (29 cases of major surgery, 2 cases of burns). 23 references.

DEXTRAN - THERAPY (Continued)

184. Dextran as a plasma substitute. J. Am. M. Ass., 1949, 139: 850-851. Generally favorable views are expressed in this editorial. 3 references.

185. Le "dextran" nouveau liquide de substitution dans le traitement du shock. Bull. internat. Serv. santé, Liége, 1949, 22: 11. 'Résumé.'

Evans, E. I., see No. 85.

186. Grönwall, A. Dextran och dess användning som plasmasubstitut. Farm. Revy, 1947, 46: 688-689. Abstract of a paper read at the Meeting of the Stockholms laborantklubb, September 1947. 5 references.

187. Grönwall, A. Some theoretical aspects on dextran as a blood and plasma substitute. Bull. internat. Serv. santé, Liége, 1949, 22: 4-7. Remarks enlarging on and supplementing Bohmansson's paper on Clinical experiences with dextran (No. 175 of this list) in regard to the theoretical aspects of blood and plasma substitutes in general and dextran in particular.

188. Grönwall, A., and Ingelman, B. Dextran as a substitute for plasma. Nature, Lond., 1945, 155: 45. Abstr.: Biol. Abstr., Balt., 1946, 41: No. 334. 7 references.

189. Hiertonn, T. Om vätskebalans vid kirurgiska sjukdomar; referat av aktuell bok jämte några reflexioner. Sven. läk. tidn., 1948, 45: 1261-1276. The use of dextran in acute hemorrhagic anemia and shock is advocated.

190. Hiertonn, T. Septic appendical peritonitis and fluid balance. Acta chir. scand., 1947-48, 96: 224-232. 'One cannot expect to obtain better results with dextran than with blood and plasma. In combatting the primary circulatory disturbances we have obtained just as good results. Dextran has no incidental effects and has the advantages besides of keeping forever and of always being ready to hand.' 17 references.

191. Hoorweg, P. G. Macrodex (gehydrolyseerd dextran), een vervangingsmiddel van bloed en plasma bij de behandeling van shocktoestanden. Ned. tschr. geneesk., 1950, 94: 1693-1700. (German, French and English abstracts). Abstr.: Chem. Abstr., 1951, 45: 3501. Data from the literature and clinical observations of the author tend to prove that Macrodex is useful in increasing the blood volume and in maintaining it at that higher level. 17 references.

DEXTRAN - THERAPY (Continued)

192. *Ingelman, B. Dextran and its use as a plasmasubstitute. Acta Cham. Scand., 1947, 1: 731-738. Abstr.: Bull. Anal. CNRS, 1948, 9: pt. 2, 2459.

193. Kock, W. Experiences in the Kronprinsessan Lovisa's Children's Hospital in Stockholm with intravenous administration of dextran in 25 cases during the period Jan. 1st - June 15th, 1947. Tr. 23rd Meet. North. Surg. Ass., Stockholm, 1947, p. 131-132. 'It seems that dextran, from which no toxic side-effects were observed in any of the above cases, may be administered to children in the same proportions and on the same indications as plasma.'

194. Køster, K. H. Dextran. Bull. internat. Serv. santé, Liége, 1949, 22: 7-11. Abstr.: Excerpta med., Sect. 9, 1949, 3: 1368. Clinical experience; desirability of a solution of dextran with higher colloidal osmotic activity than the normal 6 percent solution.

195. Køster, K. H. Om shock og behandling med blod, plasma og plasmasubstituter. Med. forum, 1949, 2: 257-279. Review article. Includes: The rôle of plasma and plasma substitutes in shock treatment. - Blood substitutes. - Their general qualities. - Physiological salt solution. - Survey of plasma substitutes: 1) Animal blood and derivatives. 2) Human ascitic fluid. 3) Hemoglobin. 4) Globin. 5) Animal gelatine. 6) Isinglass. 7) Gum acacia. 8) Pectin. 9) Methylcellulose. 10) Colloidin. 11) Periston. 12) Dextran (which is treated in considerable detail).

196. Lundy, J. S., Gray, H. K., and Craig, W. M. Dextran in supportive therapy with comments on periston and gelatin. Arch. Surg., 1950, 61: 55-61. Abstr.: Zentr. Org. ges. Chir., 1951, 118: 309. In some cases of developing profound shock, dextran has been lifesaving. 'In such cases materials such as dextran, periston and gelatin are definitely indicated for supporting circulating volume in the cardiovascular system.' Paper presented at the 57th Annual Meeting of the Western Surgical Association, Santa Barbara, California, November 1949. 7 references.

197. Lundy, J. S., Tuohy, E. B., Adams, R. C., Mousel, L. H., Seldon, T. H., and Pender, J. W. Annual report for 1946 of the Section on Anesthesiology; including data and remarks concerning blood transfusion and the use of blood substitutes. Proc. Mayo Clin., 1947, 22: 357-368; 397-400. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1081. Report on the use of a 6 percent solution of dextran (macrose) in about 300 cases; in some cases, 1gm of procaine was added.

DEXTRAN - THERAPY (Continued)

198. Pelkonen, A., Vehniäinen, E., and Vehniäinen, K. Kokemuksia dekstraanin käytöstä. Duodecim, Helsin., 1950, 66: 13-36. Abstr.: Nord. med., 1950, 44: 1339-1341. "The writers report a series of 47 patients treated in the Maria Hospital, Helsinki; the plasma substitute dextran manufactured by Pharmacia, Sweden, was used in these cases to prevent surgical shock and in treatment of manifest shock or comparable conditions... The experience with dextran was very positive in this material. In an emergency when plasma or blood is not available, dextran is at least at present invaluable.' 6 references.

199. Rasmussen, K. B. Dextran i shocktherapi og -profylaxe. Nord. med., 1948, 40: 2381-2384. In 60 patients, 125 intravenous injections of 6 percent solution of dextran for shock prevention and therapy were as effective as blood transfusions in a control series of 62 patients. Abstract in English. 7 references.

200. Ravdin, I. S. The quest for a "blood" substitute. Surgery, 1949, 26: 705-706. Comparative discussion of gelatin and dextran.

201. Ravdin, I. S., and Fitts, W. T., Jr. The so-called "blood substitutes." Am. J. Surg., 1950, 80: 744-749. Gelatin and dextran are discussed in this review article. Discussion (R. A. Griswold, C. G. Johnston, W. T. Fitts: p. 749-752). 30 references.

202. Rehn, J. Klinische Erfahrungen mit Dextran in der Chirurgie. Neue med. Welt, 1950, 1: 1330-1333. Dextran was well tolerated and effective in prevention and treatment of shock. 18 references.

203. Rosenqvist, H. Dextran vid brännskadeshock. Nord. med., 1946, 29: 344. Report of 13 cases. Abstract of a paper presented at the Meeting of the Svensk Kirurgisk Förening, November 1945.

Rosenqvist, H., see No. 92.

204. Rosenqvist, H., and Thorsén, G. Macrodex in the treatment of extensive burns. Arch. Surg., 1941, 62: 524-531. 'Eleven patients with burns of second and third degree involving between 20 and 60 percent of the body surface were treated for shock mainly with the Swedish preparation macrodex. Every case responded favorably as far as shock was concerned.'

DEXTRAN - THERAPY (Continued)

205. Thorsén, G. Chock; inledningsanförande. Sven. läk. tidn., 1951, 48: 1221-1229. The importance of macrodex in shock is explained by way of the mechanism of the changes taking place in the colloid-osmotic blood pressure.

206. Thorsén, G. Dextran. In: National Research Council. Symposium on burns, 2-4 November 1950. p. 65-70. Clinical report. Dextran 'should not be looked upon as a substitute for blood, but as a new remedy in the maintenance of a satisfactory circulating blood volume, and colloid osmotic pressure, which has many advantages, especially in smaller hospitals and in the case of war or major catastrophies.'

207. Thorsén, G. Dextran as a plasma substitute. Lancet, Lond., 1949, 1: 132-134. 'Dextran Ph is a polydispersoid polymer of glycose with a molecular weight conforming to that of albumin. It is totally eliminated from the body and is non-toxic. It is very useful as a substitute for blood and plasma in cases where an increase in blood volume or in colloid osmotic pressure is desired.' 8 references.

208. Thorsén, G. Dextran as substitute for plasma. Tr. 23rd Meet. North. Surg. Ass., Stockholm, 1947. p. 126-128. Abstr.: Excerpta med., Sect. 9, 1949, 3: 848. Dextran Ph., a '6 percent colloidal solution of a polydispersoid glucose polymer to which has been added 0.9 percent of NaCl ... is highly active colloidally and as a chock therapeutic agent'; it is nontoxic and harmless to tissue.

209. Thorsén, G. Kliniska erfarenheter med dextran. Nord. med., 1946, 29: 343. Clinical experiences with Dextran in shock prevention. Caution is advised for the time being. Abstract of a paper presented at the Meeting of the Svensk Kirurgisk Förening, November 1945.

210. Thorsén, G. Resuscitative effect of dextran Ph after large hemorrhages; an experimental study. Acta chir. scand., 1950, 100: 221-227. 'Dextran Ph has an equally great restorative effect after large losses of blood as serum or heparinized plasma.' 28 references.

211. Tovey, G. H. Blood transfusion and blood substitutes. Practitioner, Lond., 1950, 164: 171-178. The observations on "Blood substitutes" (p. 177-178) culminate in the statement that 'dextran is the latest and most promising plasma substitute... A clinical trial recently undertaken in this country suggests dextran to be as beneficial as plasma in cases of burns, and in the treatment of surgical shock and haemorrhage...' 3 references.

DEXTRAN - THERAPY (Continued)

212. *Vara, P. Observations on the use of 10 percent salt-free Macrodex (Dextran) in toxaemia of late pregnancy. Acta obst. gyn. scand., 1950, 30: Suppl. 6.

213. *Wallenius, G. The relief of nephrotic edema by dextran infusions. Scand. J. Clin. Lab. Invest., 1950, 2: 228.

214. Wilander, O., Thorsén, G., Rosenqvist, H., and Bohmansson, G. Kliniska erfarenheter med dextran. Nord. med., 1946, 29: 343-344. The anti-shock properties of Dextran are good; no definitive opinion on side effects and toxicity can be given at this time. Abstract of a paper presented at the Meeting of the Svensk Kirurgisk Förening, November 1945.

215. *Wilkinson, A. W. A clinical trial of dextran in surgical patients. J. internat. chir., Brux., 1951, 11: 186.

216. Wilson, J. S., Estes, E. H., Doyle, J. T., and Bloom, W. L. The use of dextran in the treatment of shock. J. Clin. Invest., 1951, 30: 682-683. 'Dextran appears to be a useful substitute for plasma in the treatment of shock.' Abstract of a paper presented at the 43rd Annual Meeting of the American Society for Clinical Investigation, April 1951.

DEXTRAN - TOXICITY

Bohmansson, G., Rosenqvist, H., Thorsén, G., and Wilander, O., see No. 179.

217. Engstrand, L., and Åberg, B. Excretion of intravenously administered dextran. Lancet, Lond., 1950, 1: 1071-1073. Some of the dextran that is not excreted through the kidneys or deposited in the reticulo-endothelial system leaves the body thru the alimentary tract. With ileus, fluid might then accumulate in the intestinal lumen and, therefore, dextran should be administered very cautiously in acute intestinal obstruction. 8 references.

218. Richards, D. W., Jr. Advances in plasma expanders. 3 p. No. 14 in: U. S. Army Medical Service Graduate School. Symposium on shock. 7-9 May 1951. (Processed.) Gelatin and polygelatin are discussed. Anaphylactic reactions after Swedish and British as opposed to American dextran are reported. As to PVP, we must still learn '(1) how adequately PVP sustains the plasma volume, (2) how rapidly and completely it is excreted, (3) whether it is metabolized, and (4) to what extent, and for how long, it is stored in the body.'

DEXTRAN - TOXICITY (Continued)

Thorsén, G., see No. 166.

Turner, F. P., Butler, B. C., Smith, M. E., and Scudder, J., see No. 168.

DEXTRAN - VEHICLE FUNCTION

219. May, E. Klinische Mitteilung über die peridurale Anwendung von Veritol zur Behandlung des extremen peripheren Kreislaufkollapses mit der Macrodex-Veritol-Plombe. Med. Welt, 1951, 20: 361. Case report. 8cm^3 Macrodex plus 2cm^3 Veritol were used successfully.

220. Ohlsson, W. T. L. Blodsköljningsbehandling vid svar akut barbiturförgiftning. Nord. med., 1949, 42: 1471-1473. Summary in English.

221. Thulin, K. E. N. G. Penicillin solutions. Swedish Pat. No. 121,752, May 25, 1948. Abstr.: Chem. Abstr., 1949, 43: 3154, q.v.

GELATIN

222. Blutersatzmittel. In: Merck Jahrber., 1943-1946, 57-60: 114-116.

223. Brunschwig, A., and Bigelow, R. Intravenous gelatin for nutritional purposes; clinical and experimental studies. Surg. Gyn. Obst., 1946, 82: 25-28. 'Experimental studies in dogs indicate that a certain type of gelatin administered intravenously is at least partially utilized for regeneration of plasma proteins. Clinical experience indicates that intravenous gelatin constitutes one method by which nitrogenous substances for nutritional purposes may be administered.' 1 reference.

224. Campbell, D. H., Koepfli, J. B., Pauling, L., Abrahamsen, N., Dandliker, W., Feigen, G. A., Lanni, F., and LeRosen, A. The preparation and properties of a modified gelatin (oxypolygelatin) as an oncotic substitute for serum albumin. Texas Rep. Biol. M., 1951, 9: 235-280. Preparation and chemical properties. - Physiological studies (Methods used in retention tests). - Results of retention tests. - Other data. - Clinical studies: 14 cases. 16 references.

225. McDonald, E. Progress of the biochemical research foundation of the Franklin Institute--1943-1944. J. Franklin Inst., 1945, 239: 87-100. Contains description of Dr. Ely's BRF blood plasma substitute based on gelatin (p. 92-94).

GELATIN (Continued)

226. *Monks, E. T. Gelatine and other parenteral fluids. East Afr. M. J., 1948, 25: 283-285.

227. *Morea, R., and Rao, L. Algunas consideraciones sobre nuevos plásticos, hemostáticos y tubos de avenamiento; gel foam, aspiración-cauterización, combinadas, fibrin-film, lámina y tubo de poliethileon. Sem. méd., B. Air., 1948, 55: 1318-1320.

228. Ravdin, I. S. Gelatin. In: National Research Council. Symposium on burns. 2-4 November 1950. p. 80-82. Studies with Knox P-20 gelatin; its use for Chinese troops on the Assam-Burma border. It may be given to man when indicated 'without any greater dangers than exist in the administration of blood transfusions in the modern hospital.'

GELATIN - CHEMISTRY (incl. physiological chemistry and biochemistry)

229. Campbell, D. H., and Cherkin, A. The destruction of pyrogens by hydrogen peroxide. Science, 1945, 102: 535-536. 'The necessity for the complete absence of pyrogens from solutions intended for parenteral administration is well recognized... In the course of an investigation of plasma substitutes, one of us (D.H.C.) observed that pyrogenic solutions of gelatin were rendered nonpyrogenic by heating with potassium permanganate or hydrogen peroxide. This effect was studied further...' 9 references.

Dervichian, D., and Magnant, C., see No. 3.

230. Engelfried, J. J., and Zundell, J. L. The effect of oxypolygelatin on cross-matching procedures. To be published. 'No interference in typing or cross-matching was observed when oxypolygelatin was added to the recipient's blood.'

231. Fisk, R. T., and McGee, C. A. The use of gelatin in Rh testing and antibody determinations; a rapid test tube method. Am. J. Clin. Path., 1947, 17: 737-740. '...A special solution of gelatin was found to intensify agglutination by Rh blocking antibodies. Gelatin solution was used as a plasma substitute for the titration of blocking antibodies. The behavior of gelatin was utilized to devise a rapid test tube method of Rh testing. The majority of antiserums encountered in routine antibody determinations were suitable for the new method of Rh_o or Rh_6 testing.' 2 references.

GELATIN - CHEMISTRY (Continued)

232. Janota, M. A rapid and simple technique for the determination of gelatin. J. Laborat. Clin. M., 1943, 28: 1281-1285. 'This report deals with a technique for the determination of gelatin protein in a mixture of blood and gelatin or urine and gelatin in vivo as well as in vitro...' 6 references.

233. Janota, M., Levinson, S. O., Arimoto, F., and Necheles, H. The evaluation of gelatin as a plasma substitute by the use of a standardized method of assay. Fed. Proc., Balt., 1944, 3: 21-22. 'Under the rigid conditions of the assay, 4 and 8 percent gelatins appear to be good plasma substitutes.'

234. Koop, C., and Bullitt, L. Gelatin as a plasma substitute. The effect of gelatin infusion on the subsequent typing and cross-matching of the blood, with a method of eliminating the phenomenon of pseudoagglutination. Am. J. M. Sc., 1945, 209: 28-33. 'In spite of the appearance of pseudoagglutination of erythrocytes in blood from patients who have received a previous infusion of gelatin, no practical difficulty has yet been encountered by our technicians in typing or cross-matching such blood.' 7 references.

235. *Lampert, H., and Liesegang, R. E. Blood-substitute fluid. Ger. Pat. No. 710,994, August 21, 1941. Abstr.: Chem. Abstr., 1943, 37: 3785, q.v.

236. Lanni, F., Feigen, G. A., and LeRosen, A. L. The determination of gelatin in the presence of plasma proteins. Arch. Biochem., N. Y., 1945, 8: 251-257. 'A method is described for the determination of gelatin in the presence of plasma proteins, based on the differential reaction of the Folin-Ciocaltéu phenol reagent with these materials.' 5 references.

237. Levine, M. G., and Hoyt, R. E. The use of pectin and gelatin in the processing of plasma in the blood bank. Am. J. Clin. Path., 1946, 16: 40-44. 'Gelatin or pectin may be added to whole blood in the blood bank to accelerate the sedimentation rate of the settling red blood cells...' 8 references.

238. Oncley, J. L. Gelatin. In: National Research Council. Symposium on burns. 2-4 November 1950. p. 77-79. The chemical, physical and chemical-physical properties of ossein gelatin are discussed. 5 references.

239. Sachs, B. Schnellverfahren zur Blutplasmagewinnung für Transfusionen. Deut. med. Wschr., 1948, 43-44: 650.

GELATIN - CHEMISTRY (Continued)

Abstr.: Biol. Abstr., Balt., 1949, 23: 2946. A method for rapid preparation of transfusion plasma by addition of gelatin to citrated blood is described in detail. This plasma was well tolerated.

240. Scatchard, G., Oncley, J. L., Williams, J. W., and Brown, A. Size distribution in gelatin solutions; preliminary report. J. Am. Chem. Soc., 1944, 66: 1980-1981. Abstr.: Chem. Abstr., 1945, 39: 660. 6 references.

241. Wiener, A. S., Hurst, J. G., and Handman, L. Emploi de gélatine et d'autres produits de remplacement pour le titrage des anticorps Rh univalents par la réaction de conglutination. Rev. hémat., Par., 1948, 3: 3-12. 13 references.

Youngner, J. S., and Nungester, W. J., see No. 156.

GELATIN - EXPERIMENTATION

242. Briger, C. E., Smathers, S. E., Cotterman, C. W., Dameron, J. T., and Little, J. M. The diuretic effect of gelatin solutions. Am. J. Physiol., 1944, 142: 246-252. Dog experiments lead to the conclusion that '6 percent unautoclaved gelatin is a diuretic substance when given intravenously.' 4 references.

243. Bruner, H. D., Gibbon, M. H., McCarthy, M. D., Boche, R. D., Talbot, T. R., Jr., Lockwood, J. S., and Sanders, G. B. Studies on experimental phosgene poisoning; infusions in treatment of experimental phosgene poisoning. Ann. Int. M., 1948, 28: 1125-1131. 'In phosgene-poisoned dogs concentrated plasma and pectin and gelatin solutions exerted only transient effects on the hemoconcentration, and appeared to aggravate the pulmonary edema.' The use of infusion therapy is not indicated. 16 references.

244. Brunschwig, A., Scott, V. B., Corbin, N., and Moe, R. Observations on the intravenous injection of gelatin for nutritional purposes. Proc. Soc. Exp. Biol., N. Y., 1943, 52: 46-48. 'A positive nitrogen balance or nitrogen equilibrium may be maintained in protein-depleted dogs with a gelatin solution injected intravenously as practically the sole source of nitrogen. Elevation of depressed blood plasma protein levels may obtain from intravenously administered gelatin as practically the sole source of nitrogen... At least a portion of intravenously injected gelatin appears to be metabolized since there is a substantial increase in non-protein nitrogen excretion following injections.'

GELATIN - EXPERIMENTATION (Continued)

245. Ely, J. O. The BRF blood plasma substitute and its restorative effect after acute hemorrhage. J. Franklin Inst., 1945, 239: 150-152. Animal experiments.

246. Ely, J. O., and Angulo, A. W. Experimental burns: The influence of a gelatin-glucose-salts solution on the hemoconcentration of burns. J. Franklin Inst., 1943, 235: 197-204. 'Glucose-gelatine-salts solution and blood serum were equally effective in combatting the hemoconcentration while 0.85 percent sodium chloride alone had no apparent effect.' Experiments with rabbits.

247. Gordon, H., Hoge, L. J., and Lawson, H. Gelatin as a substitute for blood after experimental hemorrhage. Am. J. M. Sc., 1942, 204: 4-11. 'Gelatin solutions appear to occupy an intermediate position between blood and crystalloidal solutions in their ability to maintain the circulation after blood loss. The restoration of the circulation by gelatin lasts sufficiently long to cover many clinical emergencies. Since the samples of gelatin which have been tested can be made up in solution and autoclaved to sterility without the development of demonstrable toxicity for the dog, further study with a view to clinical trial is indicated.' 25 references.

248. Grodins, F. S. Gelatin as a blood substitute in shock due to limb trauma. Fed. Proc., Balt., 1943-44, 2-3: 17. '...A 5 percent gelatin-saline solution is much more effective than 0.9 percent sodium chloride and is about equal to normal blood plasma in its ability to produce a sustained rise in blood pressure in animals suffering from shock due to limb trauma...' Abstract of a paper prepared for the Annual Meeting of the American Physiological Society, scheduled for Cleveland, April 1943.

249. Hamilton, A. S., Parkins, W. M., and Waltzer, F. A comparison of ten infusion fluids in the treatment of moderate and severe hemorrhage in animals. Am. J. Physiol., 1947, 150: 641-653. Abstr.: Bull. Anal. CNRS, 1948, 9: pt.2, 1324. The liquids tested include oxypolygelatin and physiological saline. Oxypolygelatin was 'less suitable' in severe hemorrhage than especially prepared plasma and 5 percent albumin.

250. Holt, J. P., and Knoefel, P. K. Changes in plasma volume and cardiac output following the intravenous injection of gelatin, serum, and physiological saline solution. J. Clin. Invest., 1944, 23: 657-665. 'Blood serum and a 3.75 percent gelatin solution are about equally retained in the vascular bed, both to a greater extent than is 0.9 percent sodium chloride.' 23 references.

GELATIN - EXPERIMENTATION (Continued)

Hueper, W. C., see No. 9.

251. Janota, M., Necheles, H., Weston, R. E., Weissman, V., and Levinson, S. O. Gelatin infusion in hemorrhagic shock. Exp. M. & S., 1943, 1: 298-303. 'Fourteen different gelatins have been tested on dogs in shock produced by graded bleeding. All of the untreated animals and most of the saline controls died. Most animals receiving gelatin survived for prolonged periods of time... The gelatin disappeared rapidly from the blood. The infusion prolonged both prothrombin and clotting times considerably in most animals. Following infusion, the plasma NPN was increased considerably until the time of complete disappearance of gelatin from the blood.' 7 references.

252. Knoefel, P. K., and Lehmann, G. Behavior in the body of some fractions of gelatin. J. Pharm. Exp. Ther., 1945, 83: 185-194. Abstr.: Bull. Anal. CNRS, 1946, 7: pt.2, 1458. Dog experiments with solutions of a bone gelatin isoösmotic with dog blood plasma. 27 references.

253. Lawson, H., and Rehm, W. S. The efficacy of gelatin solutions and other cell-free fluids in reversing the effects of nearly complete exsanguination. Am. J. Physiol., 1945, 144: 217-223. 6 references.

254. Lawson, H., and Rehm, W. S. The relative value of various fluids in replacement of blood lost by hemorrhage, with special reference to the value of gelatin solutions. Am. J. Physiol., 1943, 140: 431-438. Abstr.: Biol. Abstr., Balt., 1944, 18: No. 6119. 'It is concluded that bleeding volume under these experimental conditions is a function of the amount and type of colloid in the replacement fluid, and that the cellular content of the replacement fluid is not a limiting factor.' 10 references.

255. Levinson, S. O., Janota, M., Arimoto, F., and Necheles, H. Gelatin solution in the treatment of shock from graded hemorrhage. Surg. Gyn. Obst., 1947, 84: 925-932. Animal experiments. 40 references.

256. Levinson, S. O., Janota, M., Arimoto, F., and Necheles, H. La solución de gelatina en el tratamiento del shock por hemorragias sucesivas. Día. méd., B. Air., 1947, 19: 960-964. Translation of the article originally published in Surg. Gyn. Obst., 1947, 84: 925-932. (No. 255 of this list). 40 references.

GELATIN - EXPERIMENTATION (Continued)

257. Little, J. M., and Dameron, J. T. Plasma retention, urinary excretion and effect upon circulating total red cell volume of intravenous gelatin in normal dogs. Am. J. Physiol., 1943, 139: 438-445. 8 references.

258. Little, J. M., and Dameron, J. T. Plasma circulating total red cell volume of intravenous gelatin in dogs with diminished plasma volume. Am. J. Physiol., 1943, 140: 636-638. 3 references.

259. Little, J. M., and Wells, H. S. Capillary permeability to intravenously administered gelatine. Am. J. Physiol., 1942-43, 138: 495-498. 'It has been shown that intestinal capillaries injured sufficiently to permit the partial or complete passage of serum proteins through their walls allow the passage of only 35 to 60 percent of plasma gelatine.' 6 references.

260. Lowell, A., Colcher, H., Kendall, F. E., Patek, A. J., Jr., and Seegal, D. A comparison of the effects of high and low viscosity gelatins after their intravenous injection in man. J. Clin. Invest., 1946, 25: 226-236. While both high and low viscosity gelatins were well tolerated, high viscosity gelatin 'reached a higher initial serum concentration, was retained longer in the blood stream and was excreted more slowly...' 16 references.

261. Meyer, K., Hahnel, E., and Feiner, R. R. Experiments on erythrocyte sedimentation rate. Proc. Soc. Exp. Biol., N. Y., 1945, 58: 36-40. Addition of gelatin to normal human citrated blood considerably increased the erythrocyte sedimentation rate. 13 references.

262. Miller, R. E., and Little, J. M. Studies on the in vivo conglutination of erythrocytes following the intravenous administration of gelatin solutions. J. Cellul. Physiol., 1943, 22: 127-130. In vivo conglutination of erythrocytes in the mouse after i.v. injection of 3 and 6 percent gelatin-saline solutions is described; it disappeared within 12 and 24 hours respectively. No tissue damage was found. 8 references.

263. Morehead, R. P., and Little, J. M. A morphological study following the intravenous administration of gelatin solutions to dogs. Am. J. Path., 1945, 21: 333-338. 12 references.

264. Nicholl, R. J., Boucher, W. F., and Prince, R. W. Hemorrhagic shock; the relative effect of amino acids, amigen, and gelatin in dogs. Surg. Gyn. Obst., 1945, 80: 181-186. Under identical conditions, 3 percent solution of

GELATIN - EXPERIMENTATION (Continued)

autoclaved bovine bone gelatine proved 100 percent effective in overcoming hemorrhagic shock in dogs. While a 10 percent amino acid solution and a 10 percent solution of casein hydrolysate and pork pancreas were ineffective and red cell suspensions added to these solutions were still less effective than bbg. 14 references.

265. Parkins, W. M., and Lockwood, J. S. Studies on gelatin as a plasma substitute. Efficacy of gelatin in experimental hemorrhage and burn shock. Am. J. M. Sc., 1943, 205: 876. A 6 percent autoclaved solution of gelatin produced by alkali hydrolysis of bovine long-bone collagen was more successful in dogs subjected to hemorrhagic shock than in burned animals. Abstract of a paper presented at the Session of the Physiological Society of Philadelphia, April 1943.

266. Robscheit-Robbins, G. S., Miller, L. L., and Whipple, G. H. Gelatin - its usefulness and toxicity. Blood protein production impaired by continued gelatin by vein. J. Exp. M., 1944, 80: 145-164. 'Gelatin given for 2 to 3 days accompanied and followed by amino acid mixtures or casein digests by vein usually gives no evidence of intoxication and definite proof of utilization of the amino acids to form blood proteins... (On the other hand) gelatin may be toxic when given by vein in moderate dosage over a 1- to 2- week period... (Therefore,) gelatin by vein has definite limitations in dogs and, by implication, when used in human cases the amount given should be very carefully watched.' 6 references.

267. Vander Brook, M. J., Lyster, S. C., Graham, B. E., Pomeroy, N. E., and Cartland, G. F. Intravenously administered gelatin - a toxicity study. J. Laborat. Clin. M., 1947, 32: 1115-1120. 'Gelatin solutions prepared for intravenous therapy proved innocuous to dogs when administered intravenously following repeated massive hemorrhages over a period of several weeks. Vascular pathology was absent. The presence or increase of sudanophile droplets in the Kupffer cells was the only morphologic change attributable to gelatin. Gelatin did not interfere with the formation of hemoglobin or plasma protein and appeared not to be stored in the liver or kidneys. A major portion was excreted by the kidneys. 24 references.

GELATIN - METABOLISM

268. Kozoll, D. D., and Hoffman, W. S. The excretion of intravenously injected gelatin. Proc. Centr. Soc. Clin. Res., 1944, 17: 47-48. 'Previous studies from this laboratory

GELATIN - METABOLISM (Continued)

have indicated the effectiveness of intravenously injected gelatin solutions in cases of shock in producing hemodilution and relief of symptoms. The present study was undertaken to determine the rate of excretion of gelatin and the relation of plasma gelatin concentrations and other blood findings to this excretion...'

GELATIN - THERAPY

269. Alsever, J. B. The current status of blood substitutes. Med. Ann. District of Columbia, 1943, 12: 465-467; 488. 'I do not believe ... that the administration of macromolecular substances, such as pectin or gelatin, will ever prove to be more than a temporary emergency measure in the treatment of shock.'

Bing, J., see No. 49.

270. Brunschwig, A., Corbin, N., and Johnston, C. D. Intravenous gelatin. Ann. Surg., 1943, 118: 1058-1063. 'Some types of gelatin, injected intravenously in human patients, are well tolerated. Evidence is presented to suggest that some of the gelatin injected intravenously is catabolized, in that there is an increase in urea N. excretion during and/or following the injections in man. Intravenous injection of gelatin appears to constitute a method for administration of (part of the required) nitrogen...' 4 references.

271. Carman, J. S., Buultjens, G., and Andrews, E. Gelatin in shock. J. Ind. M. Ass., 1947, 16: 415-434. 'Specially prepared and processed ossein gelatin solution has been used in the treatment or prevention of various types of shock in over 80 cases, 32 of which are presented in detail... This gelatin solution has been found to be very valuable in the treatment and prevention of shock. Much better results can be obtained in the treatment or prevention of shock when gelatin solution is given in addition to the infusions of saline or saline and glucose than when the latter are used without gelatin... Further research is needed...' 66 references.

272. Evans, E. I. Gelatin. In: National Research Council. Symposium on burns. 2-4 November 1950. p. 83. 'We believe that degraded gelatin of the nature of P-20 is clinically (whatever it does to the dog) an effective plasma substitute. We also used it in a large number of cases of skeletal trauma and there, again, we felt that it was an effective plasma substitute.' Dextran studied in 27 severely burned patients also proved to be successful.

GELATIN - THERAPY (Continued)

Evans, E. I., see No. 85.

273. Evans, E. I., and Rafal, H. S. Studies on traumatic shock: V. The treatment of clinical shock with gelatin. Ann. Surg., 1945, 121: 478-494. (See No. 274 of this list).

274. Evans, E. I., and Rafal, H. S. Studies on traumatic shock; the treatment of clinical shock with gelatin. Tr. South Surg. Ass., 1944, 56: 94-110. '"Lightly and heavily" degraded gelatin solutions have been employed as a substitute for plasma in the treatment of shock caused by trauma or severe burns (Trauma - 67 patients; burns - 28 patients). Lightly degraded gelatin solutions seem to be retained longer in the blood stream, and appear to be as effective and safe as plasma in the management of these types of clinical shock.' Discussion by A. Blalock and H. H. Trout. 5 references.

275. Feigen, G. A. The effects of gelatin in shock due to experimental hemorrhage and trauma; a literature review. Stanford M. Bull., 1948, 6: 175-186. Discussion of efficacy, toxicity, antigenicity and pyrogenicity of gelatin and erythrocyte sedimentation. Oxypolygelatin (clinically untested) is also reviewed. 51 references.

276. Feigen, G. A., Markus, G., Sutherland, G. B., and Macpherson, C. H. Effect of circulatory overload on the retention of oxypolygelatin. To be published. A paper presented at the Meeting of the American Physiological Society at Salt Lake City, Utah, September 1951.

277. Felmus, L. B. Gelatin solution as a plasma substitute in the treatment of shock from acute blood loss. Am. J. Surg., 1949, 78: 374-378. Abstr.: Zentr. Org. ges. Chir., 1950, 116: 297-298; Excerpta med., Sect. 9, 1951, 5: 548. 97 consecutive patients received a 6 percent macromolecular gelatin solution intravenously; all responded favorably. No side effects. 20 references.

278. Fletcher, A. G., Jr., Hardy, J. D., Riegel, C., and Koop, C. E. Gelatin as a plasma substitute; the effects of intravenous infusion of gelatin on cardiac output and other aspects of the circulation of normal persons, of chronically ill patients, and of normal volunteers subjected to large hemorrhage. J. Clin. Invest., 1945, 24: 405-415. 'Observations on pulse rate, blood pressure, venous pressure, cardiac output, plasma protein, and hematocrit have been made during and after intravenous infusions of 6 percent ossein gelatin in normal subjects,

GELATIN - THERAPY (Continued)

chronically ill patients, and volunteers subjected to acute hemorrhage of 16 to 20 percent of their blood volume... Gelatin infusion produced marked and sustained hemodilution in all of these cases... Results ... indicate that gelatin administered intravenously is an effective agent in restoring and maintaining the blood volume and in abolishing the symptoms which follow such acute hemorrhage.' 27 references.

279. Hopps, H. C. The use of gelatin as a blood substitute. Illinois M. J., 1944, 86: 215-218. Abstr.: Biol. Abstr., Balt., 1945, 19: No. 21267. 'Certain selected gelatins may be stated to show considerable promise as substitutes for blood in the treatment of shock and hemorrhage...' 7 references.

280. Infusion gelatin as a blood substitute. Am. Profes. Pharmacist, 1945, 11: 229-232. Abstr.: Biol. Abstr., Balt., 1945, 19: No. 2002. A special type of gelatin derived from a refined collagen prepared from beef bone holds wide promises as a substitute material for intravenous administration in shock, hemorrhage and related conditions, to replace critical human blood, plasma and its fraction serum albumin.

281. Intravenous gelatin. J. Am. M. Ass., 1944, 124: 236. Abstr.: Bull. Anal. CNRS, 1946, 7:pt.2, 1456. A short report on the work of Brunschwig and Associates (see No. 270 of this list). 'Current Comment.'

282. Jacobson, S. D., and Smyth, C. J. A comparative study of the effects of human plasma, physiologic saline, pectin, and gelatin (4 percent and 5 percent) on the plasma volume in man. Proc. Centr. Soc. Clin. Res., 1944, 17: 45-46. 'In this investigation we studied twenty-six patients; five received pectin, four physiologic saline, three 4 percent gelatin, twelve 5 percent gelatin, and two plasma. In all cases the plasma volume was determined initially, 4 hours after the end of the infusion, and again 24 hours later...'

Janota, M., Levinson, S. O., Arimoto, F., and Necheles, H., see No. 233.

283. Koop, C. E. The use of specially prepared gelatin solution as a plasma substitute. S. Clin. North America, 1944, 24: 1300-1315. 'If the limitations of gelatine solution are kept in mind ... it will prove an effective plasma substitute.' Discusses preparation, administration, physiological properties, safety, clinical use, limitations and precautions. 12 references.

GELATIN - THERAPY (Continued)

284. Koop, C. E., Fletcher, A. G., Jr., and Riegel, C. Some clinical experience with gelatin as a plasma substitute. Am. J. M. Sc., 1944, 207: 415. Report on '190 intravenous infusions of an especially prepared ossein gelatin totaling 132 liters.' Abstract of a paper presented at the Session of the Physiological Society of Philadelphia, January 1944.

285. Koop, C. E., Fletcher, A. G., Jr., Riegel, C., and Lockwood, J. S. Gelatin as a plasma substitute; a preliminary report of clinical experience. Surgery, 1944, 15: 839-858. 20 references.

286. Koop, C. E., Riegel, C., Grigger, R. P., and Barnes, M. T. A study of protein hydrolysates, ossein gelatin and glucose in parenteral nutrition. Surg. Gyn. Obst., 1947, 84: 1065-1070. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1550. Gelatin as sole protein source in 3 patients did not induce positive nitrogen balance. 6 references.

287. Koop, C. E., Riegel, C., Vars, H. M., Ratcliffe, H. L., Parkins, W. M., and Lockwood, J. S. Studies on gelatin as a plasma substitute. Observations on toxicity and elimination of gelatin. Am. J. M. Sc., 1943, 205: 876-877. Abstract of a paper presented at the Session of the Physiological Society of Philadelphia, April 1943.

288. Kozoll, D. D., Popper, H., Steigmann, F., and Volk, B. W. Use of gelatin solutions in the treatment of human shock. Am. J. M. Sc., 1944, 208: 141-147. 'Studies on 52 patients show that the administration of 1000cc. of a 5 percent gelatin solution in normal saline was effective in the treatment of shock. It produced regularly a statistically significant hemodilution. No untoward effects were noted except an increase in the sedimentation rate, which, however, did not influence the clinical picture.' 34 references.

289. Liesegang, R. E., and Lampert, H. Kunstblut. Münch. med. Wschr., 1942, 17: 369-371. Abstr.: Zbl. Chir., 1943, 70: 1352; Klin. Wschr., 1942, 21: 957; Zentr. Org. ges. Chir., 1942, 107: 511; Chem. Abstr., 1944, 38: 2713. A hemin-gelatin solution which stimulates coagulation, may be kept at any temperature and is generally well tolerated, is suggested as 'equivalent' to fresh blood in transfusions. 7 references.

290. Lockwood, J. S. Gelatin as a plasma substitute. Surg. Gyn. Obst., 1947, 85: 114-116. Abstr.: Excerpta med.,

GELATIN - THERAPY (Continued)

Sect. 9, 1948, 2: 1538-1539. 'Neither plasma nor gelatin is more than a temporary and partial substitute for whole-blood replacement in shock due to blood loss.'

291. Lockwood, J. S. La gelatina como sustituto del plasma. Día. méd., B. Air., 1947, 19: 1765-1766. Translation of the article originally published in Surg. Gyn. Obst., 1947, 85: 114-116. (No. 290 of this list).

292. National Research Council. Evaluation of studies on gelatin preparations for intravenous use; special report from the National Research Council. J. Am. M. Ass., 1944, 125: 284.

293. Necheles, H., Levinson, S. O., Janota, M., and Arimoto, F. Preinfusion - a study in the prevention of hemorrhagic shock. Surg. Gyn. Obst., 1947, 84: 499-503. 'Preinfusions of saline solution 0.9 percent, or of gelatin solution 8 percent, given immediately before the first of a series of graded hemorrhages and reinfusions in the dog, increased significantly the mean "critical" plasma carbon dioxide values, 30 minutes after the first hemorrhage. Survival times were prolonged significantly by the gelatin solution but not by the saline solution. In the case of preinfusions given 2 hours before the first hemorrhage, only the gelatin solutions were found beneficial in raising plasma carbon dioxide values and prolonging survival time... The application of the data to the surgical patient is discussed.' 22 references.

294. Parkins, W. M., Koop, C. E., Riegel, C., Vars, H. M., and Lockwood, J. S. Gelatin as a plasma substitute: with particular reference to experimental hemorrhage and burn shock. Ann. Surg., 1943, 118: 193-213. Review article. 35 references.

295. Parkins, W. M., Saxe, L. H., and Vars, H. M. Tests of pyrogenicity, antigenicity, and the efficacy of ossein gelatin preparations in repeated massive hemorrhage and infusion. Am. J. M. Sc., 1944, 207: 414-415. Report on 190 infusions given to 100 patients. Abstract of a paper presented at the Session of the Physiological Society of Philadelphia, January 1944.

Ravdin, I. S., see No. 200.

Ravdin, I. S., and Fitts, W. T., Jr., see No. 201.

296. Riegel, C., Koop, C. E., Schwegman, C. W., Barnes, M. T., and Grigger, R. P. An evaluation of mixtures of ossein

GELATIN - THERAPY (Continued)

gelatin, hydrolyzed protein, and glucose in the parenteral nutrition of postoperative patients. Surgery, 1949, 25: 672-675. '...The substitution of gelatin (an incomplete protein) as the source of one-half the nitrogen resulted in better rather than poorer nitrogen balance...' 12 references.

297. Seldon, T. H., Lundy, J. S., Adams, R. C., and Cook, E. N. Parenteral administration of gelatin. Proc. Mayo Clin., 1945, 20: 468-469. A 5 percent solution of gelatin in physiologic solution of sodium chloride was used in more than 400 cases 'to increase blood volume in those cases in which supportive treatment (was) considered necessary.'

298. Smyth, C. J., and Jacobson, S. D. Observations on gelatin; its intravenous use. Proc. Am. Fed. Clin. Res., 1944, 1: 17-18. Observations on healthy subjects, and on patients in surgical shock after administration of 5 percent solution of purified gelatin in Ringer's or physiologic salt solution. 'Gelatin can be given safely ... it effectively increases the plasma volume, and ... warrants further clinical trial as a plasma substitute.'

299. Søndergaard, T. Blodsubstitutter. Nord. med., 1947, 36: 2311. Comments on J. Bing's paper (see No. 49 of this list) quoting Lockwood: 'Neither plasma nor gelatin is more than a temporary and partial substitute for whole-blood replacement in shock due to blood loss.'

300. Swingle, W. W., and Kleinberg, W. Plasma, gelatin and saline therapy in experimental wound shock. Am. J. Physiol., 1944, 141: 713-721. Abstr.: Bull. Anal. CNRS, 1947, 8: 5, (pt. 2) 857. 'Administering small intermittent plasma, gelatin and saline infusions over a period of hours apparently is a more effective method of preventing shock than giving a single massive infusion immediately following injury.' Gelatin was somewhat more effective than saline. 12 references.

301. Tocantins, L. M. Practical considerations in the conservation and replacement of blood in severe hemorrhage. Med. Clin. N. America, 1949, 33: 1555-1563. Albumin and gelatin are mentioned as blood substitutes in this general article which is mainly concerned with methods. 7 references.

302. Water, E. T. A comparison of isinglass and gelatin as blood substitutes. Canad. M. Ass. J., 1941, 45: 395-398. Abstr.: Chem. Abstr., 1942, 36: 1094. On the basis

GELATIN - THERAPY (Continued)

of animal experiments, 'it would seem that the use of solutions of a suitable animal gelatin rather than of isinglass offers greater assurance of effective maintenance of blood pressure because of the much longer time it remains in the blood stream of the transfused animal.' Calf skin gelatin is recommended. 1 reference.

303. Wenner, W. F. Purified gelatin solution as a blood plasma substitute. Ann. Otol. Rhinol., 1944, 53: 635-643. Review plus report on original work done at the Upjohn Research Laboratories. Experiments with animals and humans. 16 references.

GELATIN - TOXICITY

304. Brunschwig, A., and Nichols, S. The retention of intravenously infused gelatin; observations in man. Surgery, 1944, 16: 923-926. Abstr.: Bull. Anal. CNRS, 1946, 7: pt. 2, 502. 'Evidence is presented to indicate that 40 to 43 percent of gelatin injected intravenously in man as an 8 percent solution in physiologic saline is retained in that only 60 to 57 percent is recovered in the urine...' 2 references.

305. Hoffman, W. S., and Kozoll, D. D. The fate of intravenously injected gelatin in human subjects. J. Clin. Invest., 1946, 25: 575-585. 'The fate of intravenously injected gelatin was studied in 42 hospital control subjects to whom were administered 1000ml. of 5 percent gelatin... Results indicate a theoretical clinical superiority of the heavy gelatin over the lighter types. Nevertheless light gelatin has been found to be clinically effective and innocuous in the treatment of shock.' 15 references.

306. Koop, C. E., Ratcliffe, H. L., and Michie, A. J. Intravenous administration of gelatin and histologic changes in the kidney. (Editorial). Arch. Surg., 1949, 59: 185-188. Abstr.: Zentr. Org. ges. Chir., 1950, 116: 176. 'The absence of cellular degeneration as indicated by lack of necrosis in the proximal tubules or of degeneration of the brush border would indicate that marked tubular damage did not occur... Neither did qualitative tests show statistically significant alterations... A program to test the qualitative renal function following infusion of gelatin is now under way.' 20 references.

307. Patek, A. J., Jr., Kendall, F. E., Victor, J., Lowell, A., Colcher, H., and Seegal, D. Venous thrombosis after infusion with gelatin solutions containing mercurial preservatives. Am. J. M. Sc., 1946, 212: 561. 'Local

GELATIN - TOXICITY (Continued)

venous thrombosis occurred frequently in patients injected with gelatin solutions containing phenyl mercuric borate or merthiolate. Venous thrombosis did not occur in patients injected with gelatin solutions free of these mercurial preservatives.' 11 references.

308. Popper, H., Volk, B. W., Meyer, K. A., and Kozoll, D. D. Evaluation of gelatine and pectin solutions as substitutes for plasma in the treatment of shock; histologic changes produced in human beings. Arch. Surg., 1945, 50: 34-45. Abstr.: Biol. Abstr., Balt., 1945, 19: No. 18151; Bull. Anal. CNRS, 1946, 7: pt. 2, 84. Experiences with administration of gelatin and pectin solutions to a series of 317 patients favor gelatin as producing less change in the tissues. Includes bibliography.

309. Popper, H., Volk, B. W., Meyer, K. A., Kozoll, D. D., and Steigmann, F. W. Evaluation of pectin and gelatin solutions used in the treatment of shock; histologic changes produced in the human being. J. Laborat. Clin. M., 1945, 30: 352-354. '...Findings indicate that pectin is a reticulo-endothelial irritant while gelatin does not produce tissue reaction.'

310. Skinsnes, O. K. Gelatin nephrosis; renal tissue changes in man resulting from the intravenous administration of gelatin. Surg. Gyn. Obst., 1947, 85: 563-571. 'Caution is advised in use of gelatin as a treatment for shock in patients who have previously suffered renal impairment.' 26 references.

311. Skinsnes, O. K. "Hydropic" swelling of renal tubules following intravenous administration of gelatin. Proc. Inst. M. Chicago, 1946-47, 16: 254. 'Twenty-three necropsy cases of patients receiving intravenous gelatin therapy, 17 of which showed renal tubular "hydropic" changes and 6 of which displayed no such changes, were reported and compared with control cases and with cases receiving intravenous sucrose therapy.'

GELATIN - VEHICLE FUNCTION

312. Abramson, H. A., and Arsenal, E. A U. S. P. gelatin vehicle in liquid form for retardation of absorption with special reference to epinephrine. J. Allergy, 1942-43, 14: 414-419. 'A simple and effective way of preparing a gelatin vehicle for subcutaneous injection where a slow acting pharmacologic effect is desired is described. The method consists in adding sufficient urea to the gelatin solution to maintain the gel in the sol state at room

GELATIN - VEHICLE FUNCTION (Continued)

temperature... This preparation is suitable for the administration of epinephrine as well as other drugs and biologically active substances where retardation of the pharmacologic effect is desired.' 2 references.

313. Anselmino, K. J. Die Periduralanästhesie in der Gynäkologie. Zentr. Gynäk., 1944, 68: 292-299. Discusses the use of gelatin and periston which extend the period of anesthesia from 3 to 5 and 8 hours respectively and, at the same time, make it possible to limit anesthesia to 4-8 segments. 7 references.

314. Denecke, and Schneider. Periduralanästhesie. Münch. med. Wschr., 1950, 92: 649. In peridural anesthesia, Denecke prefers pantocain plus gelatine to pantocain plus periston. Abstract of a paper presented at the 67th Meeting of the Deutsche Gesellschaft für Chirurgie, Frankfurt a.M., May-June 1950.

315. Goepel, H. Die Periduralanästhesie in der Chirurgie. Chirurg, 1943, 15: 134-145. Injection of 5 per mill pantocain in 5 percent gelatin solution is suggested for induction of peridural anesthesia. 16 references.

316. Janot, M. M. Les pénicillines à action prolongée; pénicillines-retard. Ann. pharm. fr., 1950, 8: 46-61. Review article; includes discussion of colloidal solutions of gelatin and pectin. 25 percent aqueous pvp solutions (Spécilline-Subtosan, Spécia-Rhône-Poulenc) and 20 percent pvp solution with 2,000,000 units of procaine penicillin and 100,000 units of penicillin sodium (Scurocilline, Spécia-Rhône-Poulenc) are also mentioned. 'The ideal solution is still to be found.' 80 references.

317. Kabat, H., and Freedman, A. M. Effect of slowly absorbed epinephrine in experimental shock. Proc. Soc. Exp. Biol., N. Y., 1941, 46: 385-387. 'Suprarenalin-gelatin' injected into experimentally shocked cats 'will maintain the blood pressure during and following intestinal manipulation and will increase survival 300 percent.' 6 references.

318. Krönke, E. Die Anwendungsmöglichkeit der Periduralanaesthesie in der Praxis des Allgemeinkrankenhauses. Deut. Gesundhwes., 1949, 4: 1130-1136; 1166-1170. The use of a 5 percent gelatin -, 5 per mill pantocain - solution and, particularly, of a 6 percent periston -, 5 per mill pantocain solution is critically discussed. - English, French and Russian summaries. 13 references.

GELATIN - VEHICLE FUNCTION (Continued)

319. Lockey, S. D. 1:500 epinephrine in gelatin; a discussion of its action, advantages, and disadvantages. J. Allergy, 1940-41, 12: 592-598. Use of gelatin as a retardant; case reports. 6 references.

320. Loewe, L., Eiber, H. B., Alture-Werber, E., Shore, M. K. A water-soluble preparation for prolonging effective penicillin levels in body fluids. J. Laborat. Clin. M., 1947, 32: 832-836. A formula containing 300,000 O. U. of penicillin, vasoconstrictors, eucupine dihydrochloride, and 800.0 to 1,200.0mg of gelatin-dextrose mixture in 2ml of water is used to prolong effective penicillin levels in body fluids. 'It is water-soluble, nontoxic, free of local reactions, and easy to administer. It maintains measurable levels in the blood for periods up to twenty-four hours or longer and has retained its stability at room temperature for more than a year.' 17 references.

321. Parkins, W. M., Wiley, M., Chandy, J., and Zintel, H. A. Maintenance of the blood level of penicillin after intramuscular injection. Science, 1945, 101: 203-205. 'Blood concentrations of penicillin were maintained at measurable levels for as long as seven or eight hours following single intramuscular injections of penicillin in the dog and in patients by means of vehicles containing 6 percent. to 20 percent. ossein gelatin and a long-acting vasoconstrictor drug. Intramuscular administration of penicillin can thus be carried on with three instead of eight injections per day with less variation in the extremes of penicillin blood levels.'

322. Spain, W. C., Fuchs, A. M., and Strauss, M. B. A slowly absorbed gelatin-pollen extract for the treatment of hay fever. J. Allergy, 1940-41, 12: 365-377. Use of gelatin as a retardant in 95 patients. 11 references.

323. Spain, W. C., Fuchs, A. M., and Strauss, M. B. The treatment of hay fever with gelatin-pollen extracts. J. Allergy, 1942-43, 14: 376-381. 'A gelatin-pollen extract was prepared by combining the standard aqueous pollen extract with a gelatin mixture autoclaved at 20 pounds pressure for one and one-fourth hours... This improved gelatin-pollen extract shows the slow absorption rate characteristic of the previously reported gelatin-pollen extract. The gelatin-pollen extract is especially useful for the treatment of patients so sensitive as to accept poorly the usual aqueous pollen therapy.' 2 references.

HEMORRHAGE, see also SHOCK

324. Binet, L. R. Hémorragie, chock, asphyxie. 127 p. Paris, Masson, 1941.

325. *Chiche, P. Les problèmes de l'hémorragie aiguë. 60 p. Paris, 1945. Thèse-Univ., Faculté de Médecine.

326. Lawson, H. The measurement of bleeding volume in the dog for studies on blood substitutes. Am. J. Physiol., 1943, 140: 420-430. 'Procedures are described which permit bleeding volume, i.e., the volume withdrawal at controlled rates required to produce death, to be measured with usable accuracy without actually killing the animal...' 5 references.

327. Riese, J. Blutung, Blutstillung, Blutersatz. In: Zimmer, A., (ed.), Kriegschirurgie. Wien, Deuticke, 1944. v. 1. p. 132-167. Over 100 references.

328. Rungs, H. M. Le choc hémorragique; études clinique, thérapeutique, pathogénique; campagnes de Tunisie, d'Italie et de France. 121 p. Paris, Feu Follet, 1947. Bibliography (chronologically arranged): p. 117-121.

329. Wallace, J., and Sharpey-Schafer, E. P. Blood changes following controlled haemorrhage in man. Lancet, Lond., 1941, 2: 393-395. 8 references.

330. Weston, R. E., Janota, M., Levinson, S. O., and Necheles, H. Studies on hemoconcentration and shock following severe hemorrhage. Am. J. Physiol., 1942-43, 138: 450-457. 18 references.

INFUSION THERAPY (selected background material)

331. Alexander, E., Jr., Small, W., and Campbell, J. B. A dependable method for constant intravenous therapy in infants using polyethylene tubing. An. cirug., B. Air., 1948, 127: 1212-1216. Abstr.: Excerpta med., Sect. 9, 1949, 3: 312.

332. Allen, F. M. Theory and therapy of shock; excessive fluid administration. Am. J. Surg., 1943, 61: 79-92. 'Saline infusions succeeded in severe shock where the plasma failed... Shock is reversible at all stages... This result does not imply saving of life in all cases, though a later paper will give examples of the reversal with quantities of fluid which are compatible with permanent recovery...'

333. Altschule, M. D., Gilligan, D. R., and Zamcheck, N. The effects on the cardiovascular system of fluids administered

INFUSION THERAPY (Continued)

intravenously in man; the lung volume and pulmonary dynamics. J. Clin. Invest., 1942, 21: 365-368.

334. Arbeiter, H. I., and Greengard, J. Tibial bone marrow infusions in infancy. J. Pediat., S. Louis, 1944, 25: 1-12. 'A technique of tibial bone marrow infusion is presented. In forty-three attempts in thirty-four young children there were six failures and two partial failures... This technique merits further investigation...' 6 references.

335. Bailey, H. Bone marrow as a site for the reception of infusions, transfusion, and anaesthetic agents; a review of the present position. Brit. M. J., 1944, 1: 181-182. Advantages. - Disadvantages and dangers. - Technique. 2 references.

336. Bailey, H. Replenishing the circulating body fluids (continued); alternative methods. In his: Emergency surgery. 5th ed. Bristol, 1944. p. 26-31. Continuous rectal saline. - Continuous intramuscular infusion. - Bone-marrow as an avenue for infusion and transfusion. - The corpus cavernosum as a receptor of blood or plasma. 5 references.

337. Bang, O. Intraossøs infusion. Nord. med., 1944, 21: 530. Technic and indications of sternal and tibial transfusion are described; advantages in children and restless patients are stressed. Any fluid may be so injected. In the discussion, T. Strunge points out the importance of sternal infusion in war surgery.

338. *Cevese, P. G., and Mondini, P. La trasfusione endoarteriosa (Richerche sperimentali - Nota preventiva). Acta anesthesiol., 1950, 1: 49-55. Abstr.: Excerpta med., Sect. 9, 1951, 5: 548.

339. Costantini, A., Dei Poli, G., and Caldarola, L. La trasfusione endocarotidea in senso craniale quale mezzo eroico di rianimazione; studio sperimentale nello shock emorragico. Minerva chir., 1951, 6: 53-62. On the basis of experiments with 21 dogs, intracarotid injection directed toward the brain is proposed as drastic means for resuscitation in hemorrhagic shock. 27 references.

340. Costantini, A., Dei Poli, G., Ciocato, E., and Caldarola, L. Presentazione di un caso eccezionale di riviviscenza ottenuto con trasfusione endocarotidea di sangue in senso craniale. Minerva med., 1951, 42: 184-186. 4 references.

INFUSION THERAPY (Continued)

341. Doud, E. A., and Tysell, J. E. Massive intramedullary infusions. J. Am. M. Ass., 1942, 120: 1212-1213. Case report. '...This method should be more widely applied. It is particularly applicable and may prove of inestimable value in the treatment of shock in the field.'

342. French, W. E. Arterial transfusion; its clinical application. Memphis M. J., 1951, 26: 5-6. Report of 2 cases. 3 references.

343. French, W. E. Intra-arterial transfusion. Mississippi Doctor, 1950, 28: 196-198. 'One should not hesitate to use this life saving procedure after a venous transfusion fails.' 3 references.

344. Glasser, O., and Page, I. H. Experimental hemorrhagic shock; a study of its production and treatment. Am. J. Physiol., 1948, 154: 297-315. 'The value of intra-arterial transfusion in emergency is emphasized.' 25 references.

345. Heinild, S., Søndergaard, T., and Tudvad, F. Intraossøs infusion i barnealderen. Ugeskr. laeger, 1947, 109: 189-195. Report of 1000 cases without any incidents except 5 cases of osteomyelitis after permanent intra-osseons infusion. 42 references.

346. Heinrich, A. Technik und Wert der intrasternalen Injektionsmethode. Chirurg, 1942, 14: 334-337. 2 references.

347. Henning, N. Die intrasternale Injektion und Transfusion als Ersatz für die intravenösen Methoden. Deut. med. Wschr., 1940, 66: 737-739. 2 references.

348. Hiertonn, T. Komplikationer vid intraossös terapi. Nord. med., 1949, 41: 309-312. 2 case reports drawing attention to the hazards involved. The literature is reviewed. 50 references.

349. Jones, P. G., Davis, J. H., Jr., Hubay, C. A., and Holden, W. D. Physiologic mechanisms of intra-arterial transfusion. Surgery, 1950, 27: 189-197. 'An apparatus for intra-arterial transfusion is described. The physiologic principles of the method are discussed. The mechanism of recovery from hemorrhagic shock with intra-arterial transfusion has been explored by arteriography and by experiments designed to determine the fate of the infused fluids. The possibility of using an intra-arterial saline infusion in an emergency is discussed. The advantages of intra-arterial transfusion are outlined.' 10 references.

INFUSION THERAPY (Continued)

350. Jones, R. M. A new needle for the treatment of shock by sternal infusion. Surg. Gyn. Obst., 1943, 76: 587-588. 5 references.

351. Kay, B. B., and Hacker, V. D. The treatment of shock by aortio transfusion during thoracic operations. J. Am. M. Ass., 1947, 134: 604-605. Arterial transfusion is indicated in some cases of cardiac and vascular surgery. 2 references.

352. King, R. A. Methods of fluid administration in the treatment of surgical shock; an experimental comparison. Brit. M. J., 1940, 2: 485-487. Pathology of surgical shock. - Spontaneous recovery from shock. - Effect of intravenous infusions. - Effect of fluid absorption by the tissues. - Hypotonic saline. - The osmotic gradient. 26 references.

353. Kohlstaedt, K. G., and Page, I. H. Hemorrhagic hypotension and its treatment by intra-arterial and intravenous infusion of blood. Arch. Surg., 1943, 47: 178-191. Experimental study of intra-arterial infusion in hemorrhagic shock. 5 references.

354. Kugelmeier, L. M. Intraarterielle Infusion und Transfusion. Münch. med. Wschr., 1944, 91: 261-262. Intraarterial infusion is indicated only when the intravenous route cannot be used. Report of 11 cases of infusion of Tutofusin and Periston into the femoral artery. Detailed description of technique.

355. Licha, J. S. Experiences with intra-arterial transfusion. (Clinical evaluation in 10 cases). Bol. As. méd. Puerto Rico, 1941, 43: 263-275. 9 references.

356. *Modern infusionsterapi ved kururgiske sygdommo. Ugeskr. laeger, 1949, 111: 935.

357. Murphy, F. D., Correll, H., and Grill, J. C. The effects of intravenous solutions on patients. J. Am. M. Ass., 1941, 116: 104-108. 'The indiscriminate use of intravenous fluids, especially for persons with any cardiovascular defect, should be discouraged...' 33 references.

358. O'Neill, J. F., Tocantins, L. M., and Price, A. H. Further experiences with the technique of administering blood and other fluids via the bone marrow. North Carolina M. J., 1942, 3: 495-500. Brief review. Report of 116 administrations in 90 patients.

INFUSION THERAPY (Continued)

359. Page, I. H. Arterial transfusion. Practitioner, Lond., 1948, 161: 479-482. Technique and clinical uses. 9 references.

360. Page, I. H. Arterial transfusion in the treatment of shock. 6 p. No. 24 in: U. S. Army Medical Service Graduate School. Symposium on shock. 7-9 May 1951. Processed. Indications, method and mechanism are discussed. 13 references.

361. Page, I. H. On certain aspects of the nature and treatment of oligemic shock. Am. Heart J., 1949, 38: 161-192. A review of shock problems; indications and limitations of arterial transfusion. 61 references.

362. Page, I. H. Treatment of shock by intra-arterial infusion. Bull. U. S. Army M. Dep., 1947, 7: 366-370. '...The method has limited application, still its simplicity seems to recommend it where control of blood pressure and volume is important...'

363. Papper, E. M. The bone marrow route for injecting fluids and drugs into the general circulation. Anesthesiology, 1942, 3: 307-313.

364. Papper, E. M., and Rovenstine, E. A. Utility of marrow cavity of sternum for parenteral fluid therapy. War Med., Chic., 1942, 2: 277-283. 'The Tocantins method for administering fluids via bone marrow is reviewed. The sternum is recommended for infusions in adults. The needle used and the technic for placing it are described. Clinical experience with the procedure is discussed... Its increased use is advocated...' 3 references.

365. Porter, M. R., Sanders, E. K., and Lockwood, J. S. The factor of rate of transfusion with particular reference to the intra-arterial route. Ann. Surg., 1948, 128: 865-880. 'A review of pertinent literature indicates certain advantages of the arterial over the venous route of blood transfusion in the treatment of shock. However, it is possible that some of the benefits attributed to arterial transfusion are actually due to the rapid rate at which the blood had been administered. An apparatus is described which makes possible prolonged, controlled, rapid administration of fluids through vein or artery.' 7 references.

366. Reisman, H. A., and Tainsky, I. A. The bone marrow as an alternate route for transfusion in pediatrics. Am. J. Dis. Child., 1944, 68: 253-256. 10 references.

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INFUSION THERAPY (Continued)

367. *Reynaud, H. Réanimation par transfusion intracardiaque. Mém. Acad. Chir., Par., 1950, 76: 776-778. Abstr.: Excerpta med., Sect. 9, 1951, 5: 907.

368. Robertson, R. L., Trincher, I. H., and Dennis, E. W. Intra-arterial transfusion; experimental and clinical considerations. Surg. Gyn. Obst., 1948, 87: 685-704. 'A report on the rapid administration of blood intra-arterially is presented with experimental observations and report of its clinical application in 12 patients. This procedure can be lifesaving in cases of extreme emergency where the outcome may otherwise be fatal because of hemorrhage and shock.' 10 references.

369. Sarrouy, and Prost. La voie osseuse transtrochantérienne, voie de choix de la transfusion de liquides biologiques chez le nourrison. Pédiatrie, 1948, 3: 168-170. Abstr.: Excerpta med., Sect. 9, 1949, 3: 448. Technique and method as used in more than 100 cases without any incident.

370. Seeley, S. F. Intra-arterial blood transfusion. Am. J. Surg., 1949, 78: 733-735. Abstr.: Zentr. Org. ges. Chir., 1951, 118: 151. 11 references.

371. Shaffer, J. O. A method of rapid transfusion into the femoral vessels in patients without adequate peripheral superficial veins. Surgery, 1947, 21: 659-661.

372. Sharpey-Schafer, E. P., Wallace, J., Latham, A., and Pincock, A. C. Circulatory overloading following rapid intravenous injections. Brit. M. J., 1942, 2: 304-308. Experiments with subjects free from cardiovascular disease. 17 references.

373. Stevenson, C. W. Arterial transfusion, clinical application of the Page procedure. Memphis M. J., 1949, 24: 31-36. 'I would like to stress again that this - the Page Procedure - is not without danger and perhaps has only a limited use in selected cases, but, personally, I believe that the method of intra-arterial transfusion in treatment of shock is a most valuable procedure... Possibly the most important advantage of the method lies in the emphasis it places on the need for speed in the treatment of severe shock...' 10 references.

374. Stewart, J. D., Hale, H. W., and Schaer, S. M. Management of protein deficiency in surgical patients. Intravenous and intrajejunal injections. J. Am. M. Ass., 1948, 136: 1017-1021. Abstr.: Excerpta med., Sect. 9, 1949, 3: 854-855.

INFUSION THERAPY (Continued)

Tocantins, L. M., see No. 301.

375. Tocantins, L. M. Rapid absorption of substances injected into the bone marrow. Proc. Soc. Exp. Biol., N. Y., 1940, 45: 292-296. 'Substances injected into the marrow cavity of the tibia of the rabbit and of the sternum of man are almost immediately absorbed into the general circulation. Blood and glucose solutions respectively, by intramedullary injection, corrected rapidly experimental anemia and hypoglycemia induced in rabbits.' 2 references.

376. Tocantins, L. M., and O'Neill, J. F. Infusion of blood and other fluids into the circulation via the bone marrow. Proc. Soc. Exp. Biol., N. Y., 1940, 45: 782-783. 'The intramedullary route for parenteral therapy has proved practicable in 16 out of 17 trials in 14 patients. Citrated blood, plasma, glucose and salt solutions have been infused without any immediate or delayed local or constitutional reactions.'

377. Tocantins, L. M., and O'Neill, J. F. Infusions of blood and other fluids into the general circulation via the bone marrow. Surg. Gyn. Obst., 1941, 73: 281-287. 10 references.

378. Tocantins, L. M., O'Neill, J. F., and Jones, H. W. Infusions of blood and other fluids via the bone marrow. J. Am. M. Ass., 1941, 117: 1229-1234. In 9 infants where intravenous infusions were impossible, infusions into the marrow of tibia or femur were administered without any untoward reactions.

379. Tocantins, L. M., O'Neill, J. F., and Price, A. H. Infusions of blood and other fluids via the bone marrow in traumatic shock and other forms of peripheral circulatory failure. Ann. Surg., 1941, 114: 1085-1092. 'The intramedullary route is indicated whenever veins are not available and a rapid introduction of fluids into the central circulation is urgently needed.' 3 references.

380. Tocantins, L. M., Price, A. H., and O'Neill, J. F. Infusions via the bone marrow in children. Pennsylvania M. J., 1942-43, 46: 1267-1273. Report on 79 infusions in 52 infants. Presented before the Section on Pediatrics of the Medical Society of the State of Pennsylvania, Pittsburgh, October 1942. 7 references.

381. Wiener, A. S. Intra-arterial transfusion. J. Am. M. Ass., 1951, 146: 57. Letter to the editor. 'There is need for additional, carefully controlled animal experiments on intra-arterial transfusion.'

ISINGLASS

ISINGLASS - CHEMISTRY (incl. physiological chemistry and biochemistry)

382. Bett, H. D. The preparation of isinglass solutions suitable for transfusion purposes. Canad. J. Res., Sect. E, 1949, 27: 31-36. Abstr.: Biol. Abstr., Balt., 1949, 23: 2098. 'The possibilities of producing isinglass solution in sufficiently large quantity to permit adequate clinical trial on a uniform batch have been investigated. A satisfactory process has been developed using fresh frozen hake sounds. Technical details of this preparation are presented in this paper, together with comments on the occurrence and prevention of pyrogens in transfusion fluids.' 11 references.

383. Beveridge, J. M. R., and Lucas, C. C. Amino acids of isinglass. J. Biol. Chem., 1944, 155: 547-556. 'Values for twenty amino acids in isinglass have been determined. The totals of these values account for 96.6 percent of the protein, or 83.2 percent of the total nitrogen.' 36 references.

ISINGLASS - THERAPY

384. Pugsley, H. E., and Farquharson, R. F. Clinical use of isinglass. Canad. M. Ass. J., 1943, 49: 262-264. Experiences with Taylor's preparation.

385. Taylor, N. B., and Moorhouse, M. S. The use of isinglass as a blood substitute in haemorrhage and shock. Canad. M. Ass. J., 1943, 49: 251-264. 'The main requirements of an artificial transfusion material are briefly discussed. The results of a series of experiments demonstrating the value of a solution of isinglass in the treatment of acute haemorrhage are described. Transfusion either with whole blood or a solution of isinglass has proved relatively ineffective in the treatment of shock caused by muscle damage.' 10 references.

386. Taylor, N. B., and Waters, E. T. Isinglass as a transfusion fluid in hemorrhage. Canad. M. Ass. J., 1941, 44: 547-554. 'The properties of a 7 percent solution of fish gelatin or isinglass in 0.9 percent saline are described... Experiments are reported in which a 7 percent solution of isinglass in saline is capable of restoring the blood pressure after it had been lowered by haemorrhage and of saving the lives of animals which, had no treatment been instituted, undoubtedly would have died...' 15 references.

Waters, E. T., see No. 302.

MACRODEX, see DEXTRAN

MACROSE

The 'trade name "Macrose" (Schenley Laboratories, Inc.) appeared in a very few publications several years ago in connection with a solution of Dextran... Now, however, this ... name (PVP-Macrose) is used only to designate (the Schenley) brand of polyvinyl pyrrolidone solution, which is used as a blood extender.'*

METHYL CELLULOSE

387. Hueper, W. C., Martin, C. J., and Thompson, M. R. Methyl cellulose solution as a plasma substitute. Am. J. Surg., 1942, 56: 629-653. On the basis of dog experiments, a 0.5-1 percent solution of methyl cellulose fortified by detoxicating chemicals is recommended. While its use is 'subject to the same limitations as those applying to other macromolecular colloid agents,' it possesses several physiocochemical properties making it preferable to these. 11 references.

MUSCLE PROTEINS

388. Bucher, R. Blutplasmaersatz aus Muskulatur. Schweiz. med. Wschr., 1942, 72: 925. Animal experiments and self experimentation have shown cadaver muscle proteins to be 'a plasma substitute of high value.'

OXYPOLYGELATIN, see GELATIN

PECTIN

389. Hartman, F. W., Schelling, V., Brush, B., and Warren, K. W. The relative value of pectin solution in shock. J. Am. M. Ass., 1943, 121: 1337-1342. Source of pectin; preparation, includes viscosity and molecular weight; animal experiments; summary of 100 clinical cases. Discussion (V. H. Moon and H. J. Corper). 10 references.

390. Olsen, A. G. Pectin therapy and pectin types. Am. J. Digest. Dis., 1940, 7: 515-519. 'Commercial pectins are commonly adjusted as to "Grade" by dilution with cerelose, glycerine, etc. The physician should know whether his preparation is all pectin, the grade of the pectin, and what diluents are present. In addition he needs to know ash content and the chief ash constituents,

*Grateful acknowledgment is made to Dr. C. E. Dutchess, Medical Director, Schenley Laboratories, Inc. for this information.

PECTIN (Continued)

as well as the combining weight. With this knowledge pectin therapy will become more of an exact science.' 22 references.

PECTIN - CHEMISTRY (incl. physiological chemistry and biochemistry)

391. Diacono, H., and Massa, V. Sur une nouvelle source de pectine: Opuntia vulgaris Mill. Propriétés hémostatiques de ce pectine. Ann. pharm. fr., 1948, 6: 457-461. 5 references.

392. *Hirst, E. L., and Jones, J. K. N. The chemistry of pectic materials. In: Adv. Carbohydr. Chem., 1946, 2: 235-251.

393. Kopaczewski, W. La pectine et les agents gélifiants. C. rend. Acad. sc., 1949, 229: 517-519. 11 references.

Levine, M. G., and Hoyt, R. E., see No. 237.

PECTIN - EXPERIMENTATION

394. Baier, W. E., Bryant, E. F., Joseph, G. H., and Palmer, G. H. Uronic acid in animal bodies. Science, 1945, 101: 670-671. Observations made 'in connection with studies on the transfusion treatment of shock with pectin solutions (autoclaved and clarified for control of molecular size and sterility).' 5 references.

Bruner, H. D., Gibbon, M. H., McCarthy, M. D., Boche, R. D., Talbot, T. R., Jr., Lockwood, J. S., and Sanders, G. B., see No. 243.

395. Bryant, E. F., Palmer, G. H., and Joseph, G. H. Non-accumulation of pectin intravenously injected into rabbits. Proc. Soc. Exp. Biol., N. Y., 1942, 49: 279-282. 'Massive amounts of pectin in the form of autoclaved isotonic solutions may be injected into the blood stream of rabbits over a period of some weeks without causing any noticeable effect upon the internal organs of the animals. Chemical analysis showed no deposition of pectin in the liver and kidneys. No pectin could be found in the blood 7 days after injection.' 7 references.

396. Diacono, H., and Massa, V. Pectine de l'Opuntia vulgaris Mill et 'pénicilline-retard'. Ann. pharm. fr., 1948, 6: 461-463. Animal experiments. 4 references.

397. Dworkin, R. M. Effects of pectin and saline solutions on survival time of dogs in hemorrhagic hypotension. Proc. Soc. Exp. Biol., N. Y., 1944, 55-56: 20-22. Abstr.:

PECTIN - EXPERIMENTATION (Continued)

Bull. Anal. CNRS, 1947, 8: pt. 2, 855. 'Results on 50 dogs submitted to variable periods of 50mm Hg. post-hemorrhagic hypotension confirm the conclusions of Middleton and Wiggers that infusions of pectin solutions do not materially increase the chance of recovery unless they are given during an interval which does not exceed 30 minutes of such hypotension. They extend these observations in showing that these beneficial effects are certainly no better than those achieved by administration of simple saline solutions...'

398. Hueper, W. C. Experimental studies in cardiovascular pathology. VI. Pectin atheromatosis and thesaurosis in rabbits and in dogs. Arch. Path., Chic., 1942, 34: 883-901. 'Pectin solutions either freshly prepared and neutralized with phosphate buffer solution or autoclaved and neutralized were injected into dogs and rabbits. The immediate effects produced on the blood by either of the two solutions are shown in colloidoclastic leukepenia, acceleration of erythrocytic sedimentation and moderate shortening of clotting time... In dogs and rabbits given injections of the freshly prepared pectin solution, marked foam-cellular storage phenomena develop in the spleen, liver, kidney and marrow in addition to foam-cellular atheromatosis of the various arteries... Dogs and rabbits given injections of the autoclaved pectin solution showed ... only minor storage phenomena in the bone marrow and foci of hyaline degeneration and thickening of the arteries...' 19 references.

399. Hueper, W. C. Pectin intravenously. Science, 1945, 102: 233. Abstr.: Bull. Anal. CNRS, 1946, 7: pt. 2, 1458. Objections are raised to the findings of Baier, Bryant, Joseph and Palmer (Science, 1945, 101: 670) (No. 394 of this list). 'Intravenously injected pectin is ... not as harmless and fundamentally superior to other macro-molecular collidal plasma substitutes as this may appear from (their) statement.' 3 references.

400. Middleton, S., and Wiggers, C. J. Some effects of pectin solutions during posthemorrhagic hypotension. Am. J. Physiol., 1943, 140: 326-333. Abstr.: Biol. Abstr., Balt., 1944, 18: 707. 'While no evidence was obtained experimentally or at necropsy that the rapid sedimentation and agglutination produced by such solns. is harmful, the occurrence of a precipitate failure of the circulation in too many expts. and the inability to overcome this by subsequent large infusions of blood suggest that pectin infusions may exert some deleterious influence when used after severe hemorrhage. Consequently,

PECTIN - EXPERIMENTATION (Continued)

caution should be exercised in the employment of pectin solns. in such conditions.' (Biol. Abstr.).

401. Richter, G. W. Parenchymatous lesions of liver and kidney of mice due to pectin. Am. J. Path., 1950, 26: 379-387. 'Pectin, administered intravenously to mice, produces focal necrosis of the hepatic parenchyma. This appears to be related to its being taken into the affected cells in excessive amounts. Focal degenerative changes of various degrees were seen in the renal tubules. Granuloma formation has been observed in areas of focal necrosis in both liver and kidney.' 10 references.

402. Roemer, H. Zur hämostyptischen Wirkung der Pektins. Klin. Wschr., 1941, 20: 686-690. Abstr.: Zentr. Org. ges. Chir., 1942, 105: 142. Animal experiments with a watery colloidal solution of apple pectin (pH 3.5) and other pectins showed their hemostatic effectiveness which is dependent on the size of the molecules.

403. Small, C. S., Bryant, E. F., and Palmer, G. H. Studies of rabbit organs after intravenous injections of pectin solutions. Arch. Surg., 1950, 60: 575-582. Massive i.v. injections of 1.5 percent autoclaved buffered and unbuffered pectin sols. caused transitory splenomegaly and temporary renal lesions. 6 references.

PECTIN - METABOLISM

404. Jacobson, S. D., and Smyth, C. J. Plasma volume changes following the intravenous injection of pectin and physiologic saline in man. Proc. Soc. Exp. Biol., N. Y., 1942, 50: 218-220. '...Pectin when injected intravenously is effective in producing marked and sustained rises in the plasma volume of normal individuals, and ... deserves intensive study to determine its value as a blood substitute...' 3 references.

405. Kozoll, D. D., Joseph, G. H., Volk, B. W., Steigmann, F., and Popper, H. Pectin excretion studies in the human. Proc. Centr. Soc. Clin. Res., 1944, 17: 47. 'Using a chemical assay method for pectin recently described by one of us (G. H. J.), blood pectin levels and urinary pectin excretion were determined in 26 patients following the intravenous administration of 1,000 and 2,000cc. of 1.5 percent pectin solution. These quantities are the amounts advocated by us in the treatment of shock.'

406. Kozoll, D. D., Volk, B. W., Steigmann, F., and Popper, H. Pectin excretion studies in the human being. J. Laborat. Clin. M., 1946, 31: 30-39. '...Less than one-half of the

PECTIN - METABOLISM (Continued)

injected pectin is accounted for in the urine, indicating that more than one-half of the pectin injected is quickly removed from the reach of the kidney, some of which is probably deposited in certain organs...' 12 references.

PECTIN - THERAPY

Alsever, J. B., see No. 269.

407. Figueroa, L., and Lavieri, F. J. The use of pectin and other agents to prevent shock. Surg. Gyn. Obst., 1944, 78: 600-605. Abstr.: Bull. Anal. CNRS, 1946, 7: pt. 2, 722. Intravenous use in animals and man; plasma volume studies. 16 references.

408. Hartman, F. W., Schelling, V., Harkins, H. N., and Brush, B. Pectin solution as a blood substitute. Ann. Surg., 1941, 114: 212-225. Abstr.: Ber. ges. Physiol., 1942, 128: 432; Zentr. Org. ges. Chir., 1942, 104: 641. The intravenous use of pectin is proposed because 1) 'One-half percent of pure pectin solution has about the same viscosity and pressure as whole blood 2) Pectin has a high molecular weight, is nonantigenic and nontoxic,' 3) is easily prepared and preserved. Animal experiments and clinical application in 8 cases. 16 references.

409. Hartman, F. W., Schelling, V., Harkins, H. N., Brush, B., and Warren, K. The use of pectin solution as a blood substitute, with special emphasis on plasmapheresis studies. J. Am. M. Ass., 1942, 118: 1161-1162. Clinical use in 50 cases: 'The responses to pectin compared favorably in some instances with those to blood.'

410. *Joseph, G. H. Parenteral use of pectin sols. Ontario, Calif., Res. Dept., Calif. Fruit Growers Exch., 1950.

411. Kozoll, D. D., Steigmann, F., and Popper, H. Studies of pectin administration to patients not in shock. Proc. Soc. Exp. Biol., N. Y., 1943, 53: 66-67. Abstr.: Bull. Anal. CNRS, 1947, 8: pt. 2, 557. 'Pectin solution is an effective hemodiluting agent in patients not in shock. It lowers total plasma protein, hematocrit, hemoglobin, and plasma nonprotein-nitrogen. It raises the venous and arterial pressure slightly and the sedimentation rate of the erythrocytes markedly.' 5 references.

412. McClure, R. D., Warren, K. W., and Fallis, L. S. Intravenous pectin solution in the prophylaxis and treatment of shock. Canad. M. Ass. J., 1944, 51: 206-210. 'Pectin, though inferior to blood or plasma appears to be of more value than glucose or saline in the prophylaxis

PECTIN - THERAPY (Continued)

of shock in extensive surgical procedures. Pectin is non-toxic and non-antigenic in the quantity 1,000 to 1,500c.c. usually required to maintain blood pressure in the presence of shock producing conditions. Untoward results appear only after the intravenous injection of amounts in excess of 4,000c.c.' 6 references.

413. Meyer, K. A., Kozoll, D. D., Popper, H., and Steigmann, F. Pectin solutions in the treatment of shock. Surg. Gyn. Obst., 1944, 73: 327-332. 'Pectin solutions produced marked hemodilution in patients with shock and are effective in its treatment, as shown in 60 patients. No undesirable side effects were noted, save the increase in sedimentation rate; the significance of this increase in the nonexsanguinated patient is doubtful.' 19 references.

PECTIN - TOXICITY

Kozoll, D. D., Volk, B. W., Steigmann, F., and Popper, H., see No. 406.

Popper, H., Volk, B. W., Meyer, K. A., and Kozoll, D. D., see No. 308.

Popper, H., Volk, B. W., Meyer, K. A., Kozoll, D. D., and Steigmann, F. W., see No. 309.

PECTIN - VEHICLE FUNCTION, see also PECTIN - EXPERIMENTATION

414. Ambrosio, G., and Maggiora, A. Contributo allo studio della pectina come mezzo per aumentare la permanenza nel sangue della penicillina. Boll. chim. farm., 1949, 88: 73-83. Pectin gel was used successfully as a retardant in the administration of penicillin; 21 cases. 41 references.

415. Gradnik, B. Impiego della pectina como veicolo-ritardo per la penicillina. Boll. chim. farm., 1949, 88: 141-144. Pectin gel may be used as retardant, but its properties vary according to its preparation, raw material, method of sterilization, etc. 14 references.

Janot, M. M., see No. 316.

PERISTON, see POLYVINYLPYRROLIDONE

PLASMA

PLASMA - VEHICLE FUNCTION

416. Bennhold, H. Ist das Blutplasma ein strömendes Eiweissdepot oder ein Transportorgan? Deut. med. Wschr., 1947,

PLASMA - VEHICLE FUNCTION

72: 401-404. Excellent review article on the vehicle function of the plasma proteins which makes for the possibility of 'Purposeful transports.' 56 references.

417. Bennhold, H., Ott, H., and Wiech, M. Über den Bindungsunterschied lebergängiger und nierengängiger Substanzen an die Serumeiweisskörper. Deut. med. Wschr., 1950, 75: 11-15. Discusses the vehicle-function of the serum albumins. - Collidon which is excreted through the kidneys brings about a 'redirection' ('Umdirigieren') of dyes capable of being excreted through the liver because it terminates their existing combination with the serum albumin and enters into combination with them. 28 references.

PLASMA PROTEINS (selected background material)

418. Bull, H. B. Protein structure. In: Nord, F. F., and Werkman, C. H., (eds.), Advances in enzymology and related subjects. New York, Interscience, 1941, 1: 1-42.

419. Cohn, E. J. The properties and functions of the plasma proteins, with a consideration of the methods for their separation and purification. Chem. Rev., Balt., 1941, 28: 395-417. The possibility of using albumin solutions prepared from animal serum as plasma substitutes is mentioned.

420. Coquelet, O., and Van der Ghinst, M. Les aspects chirurgicaux de la protidémie. Acta chir. belg., 1947, 46: 11-16. Abstr.: Excerpta med., Sect. 9, 1949, 3: 320.

421. Cornell University Medical College and New York Hospital, Department of Pharmacology and Medicine. Conference on Therapy. The use of protein hydrolysates. Am. J. Med., 1947, 3: 472-485. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1244.

422. Ebert, R. V., Stead, E. A., Jr., Warren, J. V., and Watts, W. E. Plasma protein replacement after hemorrhage in dogs with and without shock. Am. J. Physiol., 1942, 136: 299-305. Mechanism of protein replacement. 8 references.

423. Elman, R. Protein needs in surgery. J. Mount Sinai Hosp. N. York, 1949, 15: 107-122. 19 references. Abstr.: Excerpta med., Sect. 9, 1949, 3: 1127. Also - with minor changes - in: Cincinnati J. M., 1948, 29: 680-693. 22 references. Abstr.: Excerpta med., Sect. 9, 1949, 3: 743.

PLASMA PROTEINS (Continued)

424. Elman, R., Lischer, C. E., and Davey, H. W. Plasma proteins (albumin and globulin) and red cell volume following a single severe non-fatal hemorrhage. Am. J. Physiol., 1942-43, 138: 569-576. 15 references.

425. Fuller, J., Humphreys, E. M., Steffee, C. H., Wissler, R. W., and Benditt, E. P. Fates of parenterally administered homologous serum protein and casein hydrolysate. Fed. Proc., Balt., 1949, 8: 356. '...Although the animals receiving intravenous hydrolysate (Amigen) gained far less plasma protein than those receiving serum, their plasma volume increases were nearly as great...' Abstract of a paper presented at the 34th Annual Meeting of the American Society for Experimental Pathology, April 1949.

426. Kekwick, R. A., and Martin, N. Human plasma protein fractions. Proc. R. Soc. M., Lond., 1948, 41: 217-220. After discussing the protein construction of human plasma and the ether and alcohol fractionation systems, the author sets forth the clinical application of plasma fractionation products. 10 references.

427. Stewart, J. D. Use of blood and blood substitutes. Surg. Gyn. Obst., 1947, 84: 601-604. Abstr.: Excerpta med., Sect. 9, 2: 796. 5-10 percent solutions of protein hydrolysate intravenously are suggested for use in post-traumatic protein deficiency. 20 references.

428. Stewart, J. D. Uso de la sangre y substitutos sanguíneos. Día. méd., B. Air., 1947, 19: 838-840. Translation of the article originally published in Surg. Gyn. Obst., 1947, 84: 601-604 (No. 427 of this list). 20 references.

Stewart, J. D., Hale, H. W., and Schaer, S. M., see No. 374.

429. Whipple, G. H. Blood plasma proteins. Surg. Gyn. Obst., 1941, 73: 886-887.

430. Wiley, H. M. Postoperative protein deficiency; with special reference to the cancer patient. Surgery, 1947, 21: 889-900. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1390-1391.

431. Wretlind, K. A. J. Aminosyraterapi. Nord. med., 1945, 27: 1827-1833. Abstr.: Chem. Abstr., 1946, 40: 6641. Review article. Intravenous amino acids are suggested for maintenance of proper nitrogen and protein balance and for increase of serum protein in hypoproteinemia. Report of 2 cases. 41 references.

PLASMA PROTEINS (Continued)

432. Wunderly, C. Über Modellversuche mit Plasmaproteinen als Elutionsmittel. Aerztl. Forsch., 1950, 4: 29-35. 'Comparison is made of the elution of 5 azo-dyes (Evansblue, trypanblue, benzoblue, trypanred and Victoriablue) by human albumin.' Interesting parallels to the in-vivo experiments of Bennhold and Schubert with Peristons were found. 31 references.

PLASMA SUBSTITUTES, see also HEMORRHAGE and SHOCK

433. American Medical Association. Council on Pharmacy and Chemistry. The status of blood substitutes; report of the Council. J. Am. M. Ass., 1951, 147: 658-660. 'The available preparations of artificial colloids cannot be regarded as suitable or desirable for use in the treatment of shock except in emergencies... Animal blood derivatives cannot supply the cellular elements lost by hemorrhage or blood destruction... Since the supply of human blood and its derivatives is limited, further investigation of blood "substitutes" ... is warranted.'

434. Armstrong, S. H., Jr. Management of blood preservation and blood substitutes. Bull. N. York Acad. M., 1946, 22: 451-464. 'Blood substitutes': p. 458-460. 52 references.

435. Battaglia, A. Los substitutos de la transfusión de sangre. Día. méd., B. Air., 1942, 14: 26-28. Short survey.

436. Beauquesne, L. Les substances polyuroniques (gommes, mucilages, pectines, pseudocellulose). Ann. pharm. fr., 1946, 4: 271-301. Review article. 181 references.

437. Beecher, H. K. Early care of the seriously wounded man. J. Am. M. Ass., 1951, 145: 183-200. Makes mention of blood substitutes. 7 references.

438. Bertrand, A. Sang et substituts du sang dans la transfusion. Union méd. Canada, 1942, 71: 1151-1163. Discussion includes heterologic plasma, solution of gum acacia, gelatin, isinglass and pectin. 41 references.

439. Blalock, A., and Mason, M. F. Blood and blood substitutes in the treatment and prevention of shock; with particular reference to their uses in warfare. Ann. Surg., 1941, 113: 657-676. Abstr.: Zbl. Chir., 1943, 70: 156. Discussion includes isotonic solutions of salt or glucose, hypertonic solutions of crystalloids, gum acacia, gelatin-saline and animal plasma. 47 references.

440. Blood substitutes. Internat. M. Digest, 1943, 42: 118-123. Short review. 16 references.

PLASMA SUBSTITUTES (Continued)

Blood substitutes..., see No. 174.

441. Bollman, J. D., Knutson, R. C., and Lundy, J. S. Volemic substances for replacement of blood. To be published. 'Several macromolecular substances, when injected intravenously immediately after bleeding, are effective in replacing the volume of blood after measured amounts of hemorrhage. The extent and duration of the increase in blood volume is directly related to the amount of the substances administered, provided that the molecular size is sufficient to prevent rapid elimination... The presence of macromolecular substances in the extracellular fluids appears to aid in the maintenance of volume of blood after hemorrhage.' Paper presented at the Meeting of the American Medical Association at Atlantic City, N. J., June 1951. 12 references.

442. Boyes, G. R. Human blood in therapeutics with notes on some blood substitutes. Chemist & Druggist Export Rev., Lond., 1949, 10: 43-48. French translation: ibid, p. 73-77. Spanish translation, ibid, p. 80-85. 'Substitutes for plasma,' p. 48. 10 references.

443. *Bürkle de la Camp. Bericht über die Tätigkeit der Bluttransfusionskommission (99. Tag. d. Vereinig. Niederheinischwestfälischen Chirurgen, Werne a. d. Lippe). Chirurg, 1949, 20: 250. Indexed in: Zentr. Org. ges. Chir., 1951, 117: 154.

444. Burdeshaw, H. B. Blood and blood substitute in hemorrhage and shock. J. M. Ass. Alabama, 1942, 12: 79-81. Short discussion.

Buttle, G. A. H., Kekwick, A., and Schweitzer, A., see No. 5.

445. *Chatterjee, S. N. An ideal whole-blood substitute for transfusion therapy; pharmacology of transfusion therapy in haemorrhage and conditions of shock. Ind. M. Rec., 1948, 68: 322-325.

446. Cleghorn, R. A. Studies of shock produced by muscle trauma. III. The effect of serum, isinglass, glucose, certain salts and adrenal cortical hormones on survival. Canad. J. Res., 1947, 25: E86-99. Dog experiments. 21 references.

447. Cohen, H. R. The effect of dry grinding on the properties of proteins. 1. Native, denatured and coagulated ovalbumin. Arch. Biochem., N. Y., 1943, 2: 1-8.

PLASMA SUBSTITUTES (Continued)

448. Cohen, H. R. The effect of dry grinding on the properties of proteins. 2. Studies on casein. Arch. Biochem., N. Y., 1943, 2: 345-351.

449. Cohen, H. R. The effect of dry grinding on the properties of proteins. 3. Gelatin. Arch. Biochem., N. Y., 1943, 2: 353-355.

450. Cohen, H. R. The effect of dry grinding on the properties of proteins. 4. Human, beef, and hog coagulated hemoglobins. Arch. Biochem., N. Y., 1943, 2: 357-361.

451. Cohn, E. J. Blood, blood derivatives and blood substitutes. Proc. Am. Philos. Soc., 1944-45, 88: 159-173. While this paper is mainly concerned with hematogenous blood substitutes, gelatin and isinglass are mentioned; their diameters are measured and compared with those of plasma proteins. 49 references.

452. Cohn, E. J., and associates. History of plasma fractionation. 1940-1946. 5 v. Boston, 1948. v. 1. History of plasma fractionation. - v. 2. Preparation of normal human serum albumin. - v. 3. Memoranda and reports on human fibrinogen and thrombin and derived products. - v. 4. Physical chemical studies of gelatin and other blood substitutes. - v. 5. Preparation of normal human serum albumin and other plasma products. Includes reports of conferences held by the Dept. of Physical Chemistry, Harvard University Medical School in conjunction with other institutions, papers written and results of research work done at the school, and bibliographies.

453. Dameshek, W. Transfusions of blood, transfusion reactions, and blood substitutes. Bull. N. England M. Center, 1944, 6: 62-72; 124-136; 184-191. Discussion includes (p.185-188) bovine albumin, acacia, gelatin, isinglass and synthetic colloids. 84 references.

454. Davis, H. A. The inactivation of group-specific isoagglutinins in relation to the transfusion of incompatible plasma, serum, and ascitic fluid. Surgery, 1941, 10: 592-603. 'An investigation of the factors involved in the inactivation of isoagglutinins has been carried out by means of studies in vitro and in vivo... The transfusion of incompatible ascitic fluid into human beings is reported. The significance of these studies in relation to the general problem of transfusion of group-incompatible fluids into human beings is discussed.'

PLASMA SUBSTITUTES (Continued)

455. DeGowin, E. L. Modern treatment of traumatic shock. J. Iowa M. Soc., 1944, 34: 1-7. Page 6 contains a short discussion of blood substitutes. 5 references.

456. Dost, F. H. Regulationsmechanismen des Wasserhaushaltes und ihre klinische Bedeutung im Säuglingsalter. Mschr. Kinderh., 1944, 94: 164-177. Includes discussion of use of gum acacia, gelatin injections and, particularly, Periston for treatment of exsiccation in infants. 45 references.

457. Dubois-Ferrière, H. Conceptions nouvelles sur le traitement du shock traumatique. Praxis, Bern, 1947, 36: 263-266. The author approvingly quotes the concept of Allen (No. 783 of this list) according to which isotonic saline is preferable to plasma or colloidal solutions in shock treatment. 33 references.

458. Duesberg, R. Beobachtungen über den sogenannten Wundshock, zugleich ein Beitrag zur Pathophysiologie des Entblutungszustandes. Deut. Militärarzt, 1942, 7: 69-76. Theoretical considerations and observations based on a material of some 1400 wounded soldiers. The author touches upon the problem of blood substitutes and mentions Periston. 16 references.

459. Duesberg, R., and Schroeder, W. Zur Pathophysiologie und Therapie des Entblutungszustandes. Klin. Wschr., 1942, 21: 981-988. Blood substitutes must be colloidal and non-toxic. All artificial colloid solutions are 'non-biological' because they contain foreign substance which later must be eliminated instead of the specific blood proteins. Therefore, as long as human plasma protein cannot be synthesized, human serum has to be used. 38 references.

460. Elman, R., and Lischer, C. E. Amino-acids, serum and plasma in the replacement therapy of fatal shock due to repeated hemorrhage. Ann. Surg., 1943, 118: 225-237. Abstr.: Chem. Abstr., 1943, 37: 6740. 'It may be inferred that in shock due to repeated hemorrhage a solution containing the amino-acids and peptides of hydrolyzed protein... (amigen or beef serum) has a beneficial influence as compared with glucose...' 25 references.

461. Engelhardt, A. Erwiderung. Chirurg, 1943, 15: 648. A rebuttal of the article by Lang and Schwiegk, Chirurg, 1943, 15: 647 (No. 495 of this list). 1 reference.

PLASMA SUBSTITUTES (Continued)

462. Engelhardt, A. Die Sicherung des Bestandes an Blut und Erythrozyten und ihre Beeinflussung durch isotonische Blutersatzmittel. Arch. Kreislaufforsch., 1943, 12: 73-124. See particularly p. 111-112: The intravenous administration of blood substitutes. 'Theoretically, there is no reason to use colloidal blood substitutes rather than saline or dextrose solutions.' 100 references.

463. Engelhardt, A. Ist es zweckmässig, einer Blutersatzflüssigkeit ein Kolloid zuzusetzen. Chirurg, 1943, 15: 259-263. For biological reasons, blood substitutes should not be retained in the circulation for any length of time - therefore, substitutes containing colloids are undesirable.

464. Erskine, L. A. Modern advances in the treatment of shock. N. Zealand M. J., 1943, 42: 5-9. See p. 7 for use of crystalloids, colloids and casein digests.

465. Faria, R. Modo de ação e indicações clínicas de transfusão de sangue e de sous substitutos. Arq. biol., S. Paulo, 1946, 30: 31-40. Very short mention of the various blood substitutes and their field of application. 44 references.

466. *Ferguson, J. H. O sangue e seus substitutos no tratamento racional da hemorragia e do choque. Resenha clin. cient., S. Paulo, 1944, 13: 151-155.

467. Fischer, H. H. Zur Frage einer Indikationstellung zur Anwendung von isotonischer Blutsalzlösung oder kolloidaler Blutersatzmittel. Zbl. Chir., 1949, 74: 686-695. Abstr.: Zentr. Org. ges. Chir., 1951, 117: 266. Preoperative examination and tests determine the choice of postoperative blood substitute. Mechanic replacement of the lost plasma volume is insufficient.

468. Foâ, C. Sangue, plasma e seus substitutos no combate às várias formas de choque. Resenha clin. cient., S. Paulo, 1947, 16: 323-328, 373-381. Review article including discussion of gum acacia, polyvinyl alcohol, methycellulose, capain, dextran, pectin and gelatin. 100 references.

469. Fonio, A. Blutersatz im Felde. Schweiz. med. Wschr., 1943, 47: 1416. Abstract of a paper presented at the Meeting of the Medizinischer Bezirksverein Bernstadt, February 1943.

PLASMA SUBSTITUTES (Continued)

470. Fonseca, L. C. Transfusão de sangue e substitutos em tempo de guerra. Pub. méd., S. Paulo, 1944, 15: 47-72. Review article including discussion of gum acacia, gelatin and pectin. 36 references.

Gatti, C. F. J., see No. 159.

471. Gerald, H. F. Substitutes for human blood and plasma in treatment of shock. Nebraska M. J., 1944, 29: 77-80. Gum acacia, pectin, gelatin and bovine plasma are discussed in this short review. 7 references.

472. Gibson, S. T. Blood and its derivatives. N. England J. M., 1948, 239: 544-556; 579-589. This excellent review article contains a chapter 'Blood substitutes': p. 582-583. 381 references.

473. Gordon, W. H. Blood substitutes and blood transfusion. J. Indiana M. Ass., 1947, 40: 650-653. Abstr.: Excerpta med., Sect. 9, 1948, 2: 108I. Review.

Grönwall, A., see No. 187.

474. Habelmann, G. Künstliche Flüssigkeitszufuhr. Zbl. Chir., 1947, 72: 288-297. A provocative article strongly condemning the use of so-called 'physiologic' salt solutions as well as blood transfusion and serum infusion; a new 'H-solution' i.e. a sugar solution containing the non-organic blood substances like potassium, calcium etc. (none combined with Cl) is suggested. Clinical experiment.

475. Hamilton, J. I., Hoar, W. S., and Haist, R. E. Comparison of efficacy of different infusion media in shock. Canad. J. Res., Sect. E, 1946, 24: 31-35. 'While 97 percent of the (shocked) animals died without treatment, only 8 percent died after receiving a transfusion of plasma. Saline gave about one third as many survivals as plasma, and the solutions of isinglass and polyvinyl alcohol were intermediate in their effectiveness.' 7 references.

476. Harkins, H. N., and McClure, R. D. The present status of intravenous fluid treatment of traumatic and surgical shock. Ann. Surg., 1941, 114: 891-906. Discussion includes use of gum acacia solution, amino-acid solution, casein digestate, and ascitic fluid. 97 references.

477. Henderson, J. Present status of certain blood substitutes; collective review. Internat. Abstr. Surg., 1943, 76: 1-10. Abstr.: Biol. Abstr., 1943, 17: 18043. Gelatin,

PLASMA SUBSTITUTES (Continued)

pectin and bovine plasma are included in this review article. 78 references.

478. Heusser, H. Die Bekämpfung des traumatischen und operativen Schocks in der Friedens-Chirurgie. Festschr. C. Henschen-Basel, 1947. p. 46-54. Periston and pectin were not available to the author and he preferred not to use gelatin or gum arabic.

479. *Hörler, Th. [Blood substitutes, old and new.] Schweiz. Apoth. Ztg., 1947, 85: 1018-1019.

480. Hueper, W. C. Macromolecular substances as pathogenic agents. Arch. Path., Chic., 1942, 33: 267-290. 'The presence of retained ... macromolecular compounds in the blood and tissue gives rise to functional disturbances, physicochemical reactions and morphologic organic lesions... (that) affect especially the various phagocytic cells of the liver, spleen and lymph nodes and the endothelial cells of the large and small blood vessels...' Over 100 references.

481. Ivy, A. C., Greengard, H., Stein, I. F., Grodins, F., and Dutton, D. F. Effect of various blood substitutes in resuscitation after otherwise fatal hemorrhage. Surg. Gyn. Obst., 1943, 76: 85-90. Abstr.: Biol. Abstr., Balt., 1943, 17: No. 18047. Gelatin (including two 'special' gelatins, 'U-17578' and 'plasma gel'), acacia and pectin solutions were tested. 15 references.

482. Janeway, C. A. War medicine; with special emphasis on the use of blood substitutes. N. England J. M., 1941, 225: 371-381. Useful general review, but with little material on non-hematogenous 'blood' substitutes. 118 references.

483. Janeway, C. A., Berenberg, W., and Hutchins, G. Indications and uses of blood, blood derivatives and blood substitutes. Med. Clin. N. America, 1945, 29: 1069-1092. 'Blood substitutes': p. 1091-1092. 'The following paragraphs are merely intended as a brief survey ... The results of the search for a satisfactory blood substitute do not justify a complete discussion.' 41 references.

484. Janeway, C. A., and Oncley, J. L. Blood substitutes. Advanc. Mil. Med., 1948, 1: 444-461. See particularly p. 456-461: Degradation products of other natural colloids. - Synthetic products. - Summary.

485. Janz, G. J. Alimentação parentérica e heteroplasmoterapia. Amatus Lusitanus, Lisb., 1946, 5: 454-468. Discussion

PLASMA SUBSTITUTES (Continued)

of 'blood substitutes' includes animal plasma, 'parenamine' and 'amigen': p. 461-465. Abstract of a paper presented at the 1st Curso Internacional de Medicina e Cirurgia de Urgência, June 1946.

486. Kebrov, A. A., Urinson, A. P., Urinson, Y. P., and Dmitrieva, S. P. [Clinical observations on shock patients.] Klin. med., Moskva, 1947, 4: 38-52. Abstr.: Excerpta med., Sect. 9, 1949, 3: 160. Report of 96 cases of shock; mechanism, diagnosis and therapy are discussed. The effects of Petrov's solution, 'LIPK' No. 28 and 'LIPK' No. 43 are compared.

487. Kendrick, D. B., Jr., and Newhouser, L. R. Blood substitutes in military service. Mil. Surgeon, 1942, 90: 306-315. Discussion includes bovine plasma, bovine albumin, isinglass and pectin. 26 references.

488. Kleinberg, W., Remington, J. W., Eversole, W. J., Overman, R. R., and Swingle, W. W. The effectiveness of plasma, gelatin and saline transfusions in preventing shock induced by leg muscle trauma and tourniquets. Am. J. Physiol., 1943, 140: 197-204. Abstr.: Bull. Anal. CNRS, 1947, 8: pt. 2, 231.

Køster, K. H., see No. 195.

489. Koop, C. E. Plasma substitutes. Am. J. M. Sc., 1947, 213: 233-240. Review; gelatine, fortified with amino acids or protein hydrolysates is recommended as source of parenteral protein. 94 references.

490. Koop, C. E. The management of shock and hemorrhage. Clinics, 1945, 3: 1586-1617. See particularly p. 1595-1598, 1600-1603: The administration of fluids. - Saline crystalloid solutions. - Plasma substitutes. - Amino acid preparations. - Gelatin solutions. 133 references.

491. *Korth, J. Das Verhalten der zirkulierenden Blutmenge beim akuten schweren Blutverlust und bei seiner Behandlung. Arch. klin. Chir., 1941, 202: 693. Abstr.: Zbl. Chir., 1943, 70: 1346-1347. Detailed report on experimental observations of various authors. The author himself has tested gum acacia, saline, saline plus 'Tutofusin.'

492. Lampert, H. Eine neue Allgemeinbehandlung schwerer Infektionskrankheiten, erläutert am Fleckfieber. Münch. med. Wschr., 1944, 91: 223-225. After a review of the aim of therapy in any type of infectious disease, a new

PLASMA SUBSTITUTES (Continued)

method is illustrated by its use in typhus. It includes daily intravenous colloid solutions, e.g. periston, gelatin or artificial blood ('Hämoglutin') for the prevention of circulatory collapse. This therapy may be applied generally to other infectious diseases.

493. Lang, K. Blutersatzmittel. Zbl. Chir., 1942, 69: 998-1003. Abstr.: Zentr. Org. ges. Chir., 1943, 108: 445-446. Good short survey article; dried plasma is the substitute of choice. 27 references.

494. Lang, K., and Schwiegk, H. Blutersatzmittel. Wien. klin. Wschr., 1943, 56: 579. General discussion.

495. Lang, K., and Schwiegk, H. Ist es zweckmässig, einer Blutersatzflüssigkeit ein Kolloid zuzusetzen? Chirurg, 1943, 15: 647. A reply to the paper of Engelhardt, Chirurg, 1943, 15: 259 (No. 463 of this list). The use of colloid solutions is a decisive step forward in the problem of blood substitutes. 1 reference.

496. Lang, K., and Schwiegk, H. Menschliches Serum als Blutersatzmittel. Deut. Militärarzt, 1941, 6: 561-567. Experiments with the use of synthetic colloids were not satisfactory. Saline and gum arabic are equally unsuccessful. 35 references.

497. Lang, W. R. Blood, blood derivatives and blood substitutes in obstetric and gynecologic practice. S. Clin. N. America, 1945, 25: 1465-1473. Colloidal and non-colloidal plasma substitutes are included in the discussion: p. 1471-1472. 9 references.

Lawson, H., and Rehm, W. S., see No. 254.

498. Leander, G. Klinik och behandling av traumatisk shock. Tskr. mil. hälsov., 1943, 68: Suppl., 101-109. Of blood substitutes polyvinylalcohol and pectin are mentioned, but considered inferior to blood and plasma.

499. *Lebel, M., and Leblanc, M. La réanimation en Scandinavie. Anesthésie, Par., 1950, 7: No. 3.

500. Leger, L., Lande, M., and Beauvillain, A. Prévention du choc par la novocaïne au cours de l'administration veineuse de solutions de protéines et de la transfusion sanguine. Presse méd., 1949, 57: 837-838. Abstr.: Excerpta med., Sect. 9, 1950, 4: 886. Addition of novocaine to intravenous protein solutions (25cg per 500cm^3) is suggested for the prevention of 'protein shock.'

PLASMA SUBSTITUTES (Continued)

501. Lesser, M. A. Blood plasma substitutes. Drug. & Cosmet. Indust., 1951, 68: 454-455; 536-541. Review article with stress on dextran and periston. 42 references.

502. Liebmann, A. J. Blood plasma substitutes. Chemurgic Digest, 1951, 10: No. 9, 7-8. Short review stressing dextran, gelatin and polyvinylpyrrolidone.

503. Locke, W. An experimental method for evaluating blood substitutes. Science, 1944, 99: 475-476. Abstr.: Biol. Abstr., Balt., 1944, 18: No. 18842. Percentage of surviving rats: Plasma 25, saline 40, isinglass 25, polyvinyl alcohol 65, controls 8. 6 references.

504. Loewe, H. Blutersatzmittel. Klin. & Prax., Münch., 1946, 1: 104-107. Abstr.: Bull. Anal. CNRS, 1949, 10: pt. 2, 1063. Gum arabic and gelatin are discussed, but periston is considered the most acceptable plasma substitute. 3 references.

505. *Löwen, C. H. Wirkung und Verträglichkeit körpereigener und körperfremder Blutersatzstoffe. 1946. Diss.-Düsseldorf.

506. Lundy, J. S. Balanced supportive therapy during anesthesia. Northwest Med., 1951, 50: 341-343. Periston, gelatin solutions and - mostly - dextran are discussed. 6 references.

507. Lundy, J. S. New solutions. Minnesota M., 1951, 34: 21-23. Discussion of dextran, gelatin, and periston. Paper presented at the Meeting of the Minnesota State Medical Association, Duluth, Minnesota, June 1950.

508. Lundy, J. S., Adams, R. C., Seldon, T. H., Pender, J. W., Faulconer, A., Jr., Paulson, J. A., and Ridley, R. W. Annual report for 1948 of the Section on Anesthesiology including data and remarks concerning blood transfusion and the use of blood substitutes. Proc. Mayo Clin., 1949, 24: 389-403. p. 398: Dextran (formerly drolan and macrose) gelatin and polyvinylpyrrolidone in Ringer's solution have been used frequently and successfully for the maintenance of blood volume.

509. Lundy, J. S., Adams, C., Seldon, T. H., Pender, J. W., Faulconer, A., Jr., Paulson, J. A., Ridley, R. W., Osborn, J. E., and Courtin, R. F. Annual report for 1949 of the Section on Anesthesiology including data and remarks concerning blood transfusion and the use of blood substitutes. I. Proc. Mayo Clin., 1950, 25: 553-569.

PLASMA SUBSTITUTES (Continued)

See particularly p. 566-567: Dextran and similar substances. 'Macrodex,' periston and solution of gelatin are discussed.

510. Lundy, J. S., Adams, R. C., Seldon, T. H., Pender, J. W., Faulconer, A., Jr., Paulson, J. A., Ridley, R. W., Osborn, J. E., and Courtin, R. F. Annual report for 1950 of the Section on Anesthesiology including data and remarks concerning blood transfusion and the use of blood substitutes. I and II. Proc. Mayo Clin., 1951, 26: 281-295. p. 291: 'Plasma expanders.' - Dextran (macrodex, intradex and an unnamed product) has been used in some 2,000 cases. Periston and gelatin were used in 100 and 300 cases respectively. - Dr. Knutson and Dr. Bollman are engaged in a study of the relative efficacy of plasma volume expanders in animals that have undergone hemorrhagic shock: p. 293. 9 references.

Lundy, J. S., Gray, H. K., and Craig, W. M., see No. 196.

511. *Lundy, J., and Pender, J. Supportive measures for the anesthetized patient during operation. Kansas City M. J., 1947, 23: 6.

512. Lundy, J. S., Tuohy, E. B., Adams, R. C., Mousel, L. H., and Seldon, T. H. Annual report for 1943 of the Section on Anesthesiology including data and remarks concerning blood transfusion and use of blood substitutes. Proc. Mayo Clin., 1944, 19: 408-418; 438-440. 'Certain blood substitutes, for example, pectin and gelatin, have been used with varying success.'

513. McCarthy, M. D., and Parkins, W. M. Comparative effectiveness of albumin, globin, hemoglobin, gelatin, osypolygelatin, saline, Ringer's blood and plasma upon the survival of rats subjected to standardized scald burns. Am. J. Physiol., 1947, 150: 428-443. 12 references.

514. Maes, U., and Davis, H. A. Clinical applications of recent knowledge concerning blood substitutes. N. Orleans M. & S. J., 1942, 95: 259-266. Review article; discussion includes bovine serum and derivatives, horse serum and derivatives, gum acacia and gelatin. 44 references.

515. Martinez Alonso, E. Treatment of haemorrhage and shock. Brit. M. J., 1944, 2: 21-22. Use of mixture of calcium gluconate, hypertonic saline, and pholedrine (veritol) by intravenous drip was successful in the Spanish Civil War.

PLASMA SUBSTITUTES (Continued)

516. *Martinez Alvarez, A. Estudio referente al plasma sanguineo, suero sanguineo y sueros artificiales. Pasteur, 1943, 1: 55-57.

517. *Masmonteil, F., and Boureau, J. Indications des transfusions et perfusions. Leurs dangers. Bull. Soc. chir. Paris, 1949, 39: 43-46. Abstr.: Excerpta med., Sect. 9, 1949, 3: 1495.

518. Masshoff, W. Die pathologische Physiologie und Anatomie des Blutersatzes. In: Fiat Rev., 1939-1946, Spec. Path., Wiesb. 1948. Pt. 2, p. 1-54. See particularly p. 43-48 where gelatin, gum arabic and periston are discussed. 112 references.

519. *Massons Esplugas, J. M. El problema de la transfusión de sangre y sus sustitutos en la guerra que acaba de finalizar. Farmacoter. actual. Madr., 1945, 2: 629-636.

520. Morrison, A. E., Jr. An evaluation of replacement fluids in laboratory animals following controlled hemorrhages. Thesis-Univ. of Minn., 1949. 'In this study, Dextran Ph (a polysaccharide of high molecular weight), Plasmoid (osseous bovine gelatin), and Periston (a synthetic polyvinyl pyrollidone) were compared with normal saline, human serum albumin, and human plasma, and blood in various species of laboratory animals following hemorrhage.' 73 references.

521. Mudd, S., and Thalheimer, W., eds. Blood substitutes and blood transfusion. 407 p. Springfield, Ill., Thomas, 1942.

522. Muether, R. O. Blood transfusions and blood substitutes. J. Missouri M. Ass., 1943, 40: 363-364. 'Acacia, pectin, gelatin and isinglass have not proved entirely satisfactory.'

523. Murakami, S. Kyū-sei sikketu-zi ni okeru yuketu daisyō-ski ni kan-suru kenkyū. [A study on solutions which may be substituted for the blood in transfusions for treatment of acute hemorrhage.] Kaigun Gunikai Zassi, Tokyo, 1940, 29: 147-178. Abstr.: Far East Sc. Bull., Wash., 1943, 3: 25-26. 'For the substitution for blood to be transfused for the treatment, the following solutions were prepared: (a) for intravenous injection, 1.8-2.5 percent NaCl + 5 percent glucose + 0.05 percent KCl + 1.5 percent gelatin + a small amount of Ca; (b) for intravenous injection the same as (2) except that 6 percent gum arabic was substituted for gelatin; (c) for

PLASMA SUBSTITUTES (Continued)

subcutaneous injection, the same as (2) with the exclusion of Ca. Of these (a) and (b) were both found to be satisfactory, and (c) was less satisfactory, but superior to the physiological saline solution...' 109 references.

524. Nance, M. Blood and blood products. J. Pharm., Lond., 1950, 2: 273-285. See p. 283-284: 'Plasma substitutes.' Short discussion of gum arabic, Periston and Dextran Ph. 55 references.

525. Newhouser, L. R., and Kendrick, D. B., Jr. Use of blood substitutes by armed forces. Med. Ann. District of Columbia, 1942, 11: 12-15. Among the 'newer blood substitutes' mentioned, we find bovine plasma, casein hydrolysate, isinglass and pectin. 'Until they have undergone rigid clinical trial they should not be accepted for use by the armed forces.' 8 references.

526. Nicoll, G. A. Blood transfusion substitutes; present status. N. Orleans M. & S. J., 1944, 97: 211-217. Review article, including discussion of gelatin, isinglass, pectin and other 'miscellaneous' substitutes. 28 references.

527. Oliveira, E. de. Ressuscitação em cirurgia; conceito moderno do tratamento do choque. Hospital, Rio, 1948, 33: 223-240. For use of blood substitutes, see p. 232. 117 references.

528. Ravitch, M. M., and Blalock, A. An evaluation of blood and blood substitutes. Surg. Gyn. Obst., 1942, 74: 348-352. Abstr.: Zentr. Org. ges. Chir., 1943-44, 110: 211-212. 'Preliminary observations indicate that purified human albumen is a safe and effective substitute for plasma. The problem of providing blood substitutes in large quantities will be greatly simplified if nonantigenic fractions of animal plasma proteins can be prepared.'

Richards, D. W., Jr., see No. 218.

529. Riedel, G., and Zipf, K. Tierexperimentelle Untersuchungen über Blutersatzmittel. Arch. exp. Path., Lpz., 1944, 203: 25-33. Abstr.: Biol. Abstr., Balt., 1946, 20: 280. Comparative experiments on cats, rabbits and rats with periston, starch-Ringer solution, gum arabic-Ringer solution, and normosal. After intravenous Periston, the Kupffer star cells of the rat liver were enlarged. 42 references.

PLASMA SUBSTITUTES (Continued)

Riese, J., see No. 327.

530. Rosenthal, O., and McCarthy, M. D. The plasma non-protein nitrogen distribution and its correlation with the efficacy of fluid replacement therapy following thermal injury. J. Clin. Invest., 1947, 26: 827-836. Abstr.: Chem. Abstr., 1949, 43: 7110. Fluids used in these rat experiments include saline, gelatin solution, human albumin solution and rat plasma. 11 references.

531. Round table discussion on therapy with blood substitutes in childhood. J. Pediat., S. Louis, 1942, 20: 507-519.

532. Schallock, G. Anatomische Untersuchungen über das Schicksal von Blutersatzmitteln im Empfängerorganismus und der durch sie ausgelösten Reaktionen. Beit. path. Anat., 1943, 108: 405-451. Abstr.: Chem. Abstr., 1946, 40: 6639; Zbl. Bakt., 1944, 145: 218-219. The fate of the blood substitutes (colloids) in the organism depends on the quantity of blood present, on the amount of the substitute injected, and on the type of the disease. Excess liquid is stored in the connective or lymphatic tissue, or partly excreted by the kidneys. Anatomical methods are not well suited to follow the fate of foreign colloids and of the non-colloids. In animal experiments, no pathological changes were observed after gum arabic, gelatine, salt and dextran solutions. 109 references.

533 *Scheidy, S. F. New trends in chemotherapy; sulfonamides, blood substitutes and nutritional supplements. Deut. tierärztl. Wschr., 1949, 56: 39-45.

534. Scott, C. C., Worth, H. M., and Robbins, E. B. Comparative value of some blood substitutes used for treatment of experimental shock. Arch. Surg., 1944, 48: 315-318. Abstr.: J. Am. M. Ass., 1944, 124: 797-798. Substitutes tested include solutions of gelatin, pectin and polyvinylalcohol. 30 references.

535. Seldon, T. H. Supportive therapy during anesthesia and operation. J. Am. M. Ass., 1949, 141: 1279-1284. While discussing the restoration of blood volume, the author gives concise opinions on solution of acacia, solution of gelatin, pectin, periston and dextran.

536. Sturgis, C. C. Therapeutic value of blood and blood substitutes. Rocky Mountain M. J., 1941, 38: 274-286. Contains but little pertinent material: p. 280. 26 references.

PLASMA SUBSTITUTES (Continued)

537. The supply and use of blood and blood substitutes. Med. J. Australia, 1943, 1: Suppl. 6, 21-24. 'Gum acacia is now rarely used, because it is regarded as too toxic; but similar types of substitute, such as gelatin, isinglass and pectin, have been proposed. It is unlikely that they will be extensively tried while blood, which is obviously better, can be freely obtained from voluntary donors.' 4 references.

538. Thomas, G. F. Sustitutos de la sangre. Rev. As. méd. argent., 1943, 57: 786-791. Abstr.: Biol. Abstr., Balt., 1944, 18: No. 21293. One of the best review articles available in Spanish. 17 references.

539. Thompson, C. E. Blood substitutes and parenteral fluids - use and abuse in internal medicine. Nebraska M. J., 1947, 32: 146-147. 'Blood derivatives provide the most effective blood substitutes.'

540. *Thorsén, G., and Hint, H. Aggregation, sedimentation and intravasal 'sludging' of erythrocytes; interrelation between suspension stability and colloids in suspension fluid; an experimental study. Acta chir. scand., 1950, Suppl. 154.

541. Vincke, E., and Never, H. E. Untersuchungen über Blutersatzflüssigkeiten. Chem. Zentr., 1941. 1: 2817-2818. Translated in Chem. Abstr., 1943, 37: 6316. Abstract of a paper published in Zschr. ges. exp. Med., 1939, 106: 1-22. The effects of 39 blood substitutes on the isolated intestine were determined (according to Magnus's method) and the influence of varying composition of the solutions was investigated.

542. Warren, K. W., and Harkins, H. N. The use of plasmapheresis experiments as an index of the efficacy of blood substitutes. Papers Michigan Acad. Sc., 1942, 28: 677-681. Abstr.: Biol. Abstr., Balt., 1943, 17: No. 1646. Comparison of normal saline and Locke's solution, 'sodium chloride, 0.9; calcium chloride, 0.024; potassium chloride, 0.042; sodium bicarbonate, 0.03; dextrose, 0.1; and distilled water, 100.0.' 5 references.

543. Weinstein, J. J. Use of parenteral fluids in treatment of shock. Med. Ann. District of Columbia, 1947, 16: 478-484. Specific statements are made about animal gelatin ('probably the best'), pectin, amino acid or protein hydrolysate solutions, including an 'enzymatic digest of a fraction of mammalian blood ... prepared by the Baxter Laboratories.' 6 references.

PLASMA SUBSTITUTES (Continued)

544. White, C. S. Uses and abuses of intravenous therapy and blood substitutes. Med. Ann. District of Columbia, 1949, 18: 294-297; 333-334. Discussion includes gelatin, pectin, acacia, bovine plasma and serum, ascitic fluid and dextran. 13 references.

545. Widström, G., Wilander, O., and Swedberg, B. Reaktionsframkallande faktorer och riskmoment vid infusioner och transfusioner. Nord. med., 1945, 26: 800-808. Polyvinylalcohol and periston are satisfactory plasma substitutes and preferable to gum acacia and isinglass. Dextran is mentioned. 63 references.

546. Wilhelmj, C. M. Blood substitutes and parenteral fluids - derivation and their relative values. Nebraska M. J., 1947, 32: 136-137. Gum acacia, isinglass, gelatin and pectin are discussed briefly.

547. Willenegger, H. Der heutige Stand der Blutersatzfrage. Schweiz. med. Wschr., 1947, 77: 614-617. Abstr.: Askeri vet. mecmuasi, 1948, 26: 127. Bovine serum, gelatin, isinglass, gum arabic, pectine, methyl cellulose, polyvinylalcohol, periston and dextran are discussed in this brief, but thorough review article. Over 50 references.

548. Zweifach, B. W. Peripheral circulatory changes as criteria for hemorrhagic shock therapy. Circulation, N. Y., 1950, 1: 433-444. 'C. Restoration of Blood Volume with Several Blood Substitutes: Nine dogs were transfused during the hyporeactive stage: 3 with 5 percent bovine albumin, 3 with an isotonic mixture of albumin and concentrated globulins, and 3 with a solution of 2 percent sodium succinate. None of the dogs showed a sustained recovery either of the blood pressure or of the vascular reactivity...' 15 references.

PLASMOSAN, see POLYVINYLPYRROLIDONE

POLYSACCHARIDES, see DEXTRAN

POLYVINYLALCOHOL

549. Boudreaux, J. Plasma sanguin conservé et plasmas artificiels synthétiques dans le traitement du shock traumatique et des hémorragies. Paris méd., 1945, 35: 23-28. Short, but thorough discussion of polyvinyl alcohol and the 'far superior' polyvinylpyrrolidone (Solution 143RP or Subtosan). 14 references.

POLYVINYLALCOHOL (Continued)

550. Hueper, W. C., Landsberg, J. W., and Eskridge, L. C. The effects of intravenous and intraperitoneal introduction of polyvinyl alcohol solutions upon the blood. J. Pharm. Exp. Ther., 1940-41, 70-71: 201-210. The immediate effect is reduction in number of erythrocytes and amount of hemoglobin plus accelerated sedimentation rate. Repeated administration may lead to complete suppression of clotting. Polyvinyl alcohol is retained in blood and numerous organs for a prolonged period. 20 references.

551. Roome, N. W., Ruttle, L., Williams, L., and Smith, W. The polyvinyl alcohols as blood substitutes. Canad. M. Ass. J., 1944, 51: 293-299. Abstr.: Biol. Abstr., Balt., 1945, 19: No. 6236. Results of animal experimentation. Also administration to 4 human subjects. 11 references.

POLYVINYLPYRROLIDONE

Blutersatzmittel, see No. 222.

552. Cheymol, J. Coloide sintético de aplicaciones farmacológicas múltiples. México farm., 1948, 14: 22-23. Translation, without references, of the paper following paper (No. 553 of this list).

553. Cheymol, J. Un colloïde synthétique à applications pharmacologiques multiples. Ann. pharm. fr., 1946, 4: 266-269. Abstr.: Chem. Abstr., 1947, 41: 7059. 'A review and discussion of the use and merits of "Kollidon..." a vinylpyrrolidone obtained by copolymerization of pyrrolidone and C_2H_2, as artificial plasma.' (Chem. Abstr.) 15 references.

554. General Aniline and Film Corporation. P. V. P., polyvinylpyrrolidone; preparation, properties and applications in the blood field, and in other branches of medicine. 174 p. New York, 1951.

555. Hecht, G., and Weese, H. Periston, ein neuer Blutflüssigkeitsersatz. Münch. med. Wschr., 1943, 90: 11-19. Abstr.: Bull. War M., Lond., 1943, 3: 511; Zbl. Chir., 1943, 70: 1793; Chem. Abstr., 1944, 38: 1607; Zentr. Org. ges. Chir., 1943, 109: 580. Discussion of preparation and experimental use of Periston and *Periston (the latter having higher viscosity). 34 references.

556. Murat, M. Etude de certaines propriétés chimiques et pharmacodynamiques de la polyvinylpyrrolidone. Produits pharm., 1949, 4: 350-356; 397-403. Physico-chemical properties of pvp. - Dosage. - Humoral changes after

POLYVINYLPYRROLIDONE (Continued)

subtosan injections. - Effect of subtosan on kidneys, liver and lungs. - On certain pharmacodynamic properties of pvp. - On use of subtosan combined with hormones, novocain and salicylates. - Mechanism of the 'retarding' effect of subtosan. 38 references.

557. Murat, M. Etude de certaines propriétés chimiques, pharmacodynamiques et pharmacologiques de la polyvinlypyrrolidone. 86 p. Lyon, 1945. Thesis-Univ. of Lyon. Contents: History. - Polyvinylpyrrolidone. - Reducing powers. - Dosage. - Physicochemical properties. - Hyperviscous solutions. - Hypertonic subtosan combined with novocaine; with insulin; with fontamide; with salicylate. - Comments and conclusions. Bibliography: p. 85-86.

558. Pellerat, J., Maral, R., and Murat, M. Les applications du subtosan-retard. J. méd. Lyon, 1947, 28: 641-658. Physico-chemical study. - Histological study. - Metabolism of 'subtosan-retard' in man. - Humoral changes after subtosan injections. - Study of combinations with pharmaceuticals (penicillin, hormones, novocain, salicylate, sulfonamides, cyanide of mercury, prostigmin, antihistamines etc.). - Mechanism of action. - Medical applications of subtosan alone. - Good review article with original ideas. 31 references.

559. Schenley Laboratories, Inc., New York, N. Y. PVP (Macrose); polyvinyl pyrrolidone 3.5 percent solution. 7 p. New York, 1951. Processed. 'This advance information on PVP (MACROSE) is designed for the convenience of the many persons who have inquired concerning this outstanding plasma substitute. It should be noted that PVP (MACROSE) is now under extensive clinical investigation but is not yet commercially available. A more comprehensive and detailed report will be prepared later.'

560. Schubert, R. Einfluss von Kollidon auf Tetanustoxin. Ärztl. Forschg., 1949, 3: 425-428. Animal experiments; report of one case. 11 references.

561. Schubert, R. Über die Ausscheidung an Periston gebundener Stoffe (Bilirubin, Indigokarmin) und Einiges über die Ausscheidung von Periston selbst. Klin. Wschr., 1948, 26: 143-149. Also in: Zschr. ges. exp. Med., 1945, 114: 634-655. Clinical experiments on vehicle function and secretion of Periston. (Side effects did not occur). Acceleration of the BSR was observed in all but one cases. 15 references.

562. Thrower, W. R., and Campbell, H. Plasmosan; a synthetic substitute for plasma. Lancet, Lond., 1951, 1: 1097-1099.

POLYVINYLPYRROLIDONE (Continued)

'Plasmosan has been given for various conditions in adults and infants for whom the use of fresh or reconstituted plasma would normally be indicated, and it seems to be interchangeable with plasma and to have no contra-indications... Plasmosan keeps perfectly well and requires no special conditions for storage.' 7 references.

563. U. S. Chemical War Service. Industrial Intelligence Staff. Developments in the German chemical industry. Chem. Eng. News, 1945, 23: 1516-1522. A short paragraph on p. 1521 refers to the development of 'a synthetic polymer, polyvinyl pyrrolidone; this in 2.5 percent solution found use as a blood substitute, for the treatment of shock, etc. Over 300,000 units had been used... evidently without deleterious effects. The product was called Periston.'

564. Weese, H., Hecht, G., and Reppe, W. [Blood-plasma substitute for infusions.] Ger. Pat. No. 738,994, August 5, 1943. Abstr.: Chem. Abstr., 1945, 39: 5408, q.v.

POLYVINYLPYRROLIDONE - BIBLIOGRAPHY

565. Schenley Laboratories, Inc. Macrose-polyvinyl pyrrolidone-and the blood program. The Company, 1950. Macrose (periston) is approached in this 'interim paper' in two ways: A bibliography with 119 entries precedes detailed 'Selected abstracts and papers.'

POLYVINYLPYRROLIDONE - CHEMISTRY (incl. physiological chemistry and biochemistry)

566. Bergold, G. Inaktivierung des Polyeder-Virus durch Kollidon. Zschr. Naturforsch., 1948, 3b: 300-301. 8 references.

567. Bovet, D., Jacob, R., Ducrot, R., and Courvoisier, S. Action des amides et en particulier du N-N-diéthylacétamide dans la prévention du choc traumatique du rat. C. rend. Acad. sc., 1947, 224: 496-498. α-pyrrolidone, N-ethylpyrrolidone and N-acetylpyrrolidone show a certain effectiveness in preventing traumatic shock in rats; possibly, the effectiveness of pvp is partly due to the presence of this nucleus.

568. *Dobry, A., and Boyer-Kawenoki, F. [Compatibility of polyvinylpyrrolidone and other polymers in aqueous solutions.] Bull. Soc. chim. belges, 1948, 57: 280-285. Abstr.: Chem. Abstr., 1949, 43: 6460.

POLYVINYLPYRROLIDONE - CHEMISTRY (Continued)

569. *Finkentscher and Herrle. Polyvinylpyrrolidone. Mod. Plastics, 1945, 23: No. 3, 157-162, 212, 214, 216, 218. Abstr.: Chem. Abstr., 1946, 40: 2033. Chemistry of PVP. Listed as quoted in Chemical Abstracts.

570. Formaggio, T. G. Tecnica per l'attivazione degli anticorpi Rh 'incompleti' mediante l'uso di derivato polivinilico. Sangue, 1950, 23: 243-247. 'The author reports a method for detection of "incomplete" antibodies with the use of "polyvinylpyrrolidone" (PVP). Red blood cells at 2 percent in 6.5 percent PVP isotonic saline solution are easily, strongly and specifically agglutinated by "conglutinating" anti-sera, diluted with isotonic NaCl solution. The 6.5 percent PVP solution gives a conglomeration of red blood cells sensitized with 'incomplete" anti-sera and washed with saline, as the anti-globulin serum does.' 15 references.

571. Gleiss, J. Der Kollidonzusatz als einfaches Mittel zur rationellen Plasmagewinnung für Plasmainfusionen beim Kind. Zschr. Kinderh., 1948-49, 66: 455-463. The addition of 1 g percent of Kollidon to citrated blood accelerates the sedimentation rate and thereby speeds the preparation of plasma without presenting any disadvantages. 36 references.

572. Gleiss, J. Der Kollidonzusatz als Mittel zur rationellen Plasmagewinnung. Klin. Wschr., 1949, 27: 177. Determination of the kollidon concentration as an aid in securing optimal plasma yield of citrated blood. 9 references.

573. Guillot, M., and Fiehrer, A. Influence de la solution de polyvinylpyrrolidone sur la vitesse de sédimentation sanguine. Paris méd., 1947, 134: 323-324. Also in: Sang, Par., 1948, 19: 59-61. The accelerated sedimentation rate has to be taken into consideration in diagnosis; it also raises the question if pvp does not also cause variations in the functional properties of the erythrocytes.

574. Heinen, W., and Kowatsky, U. Ueber eine wesentliche Verkürzung der Blutkörperchensenkungsreaktion für die ärztliche Praxis. Med. Klin., Berl., 1949, 44: 505-506. A time saving suggestion for laboratory diagnosis is offered: an addition of Kollidon to citrated blood serves to accelerate the blood sedimentation rate. (See also No. 583 of this lis

575. Hummel, K. Der Nachweis bindender, aber nicht agglutinierender Antikörper (Glutinine) in Blutgruppenseren mit Hilfe von Polyvinylpyrrolidon. Zschr. Immunforsch., 1950, 5: 418.

POLYVINYLPYRROLIDONE - CHEMISTRY (Continued)

576. Löffler, W. Über Modellversuche mit Plasmaproteinen als Elutionsmittel. Ärztl. Forschg., 1950, 4: 29-35. In vitro measurements of the 'washing time' for Evans-Blue, an acid tolidine dye, show, after 72 hours an elution of 24.1 percent by 0.1 percent albumin in NaCl and of 36.1 percent by pvp ('Subtosan'). 31 references.

577. Magendie, Servantie, Duplan and Moulinier. Solutions polyvinyliques et sang conservé. Presse méd., 1948, 56: 200. Precautions against in vitro coagulation of blood-subtosan mixtures. Abstract of a paper presented at the Meeting of the Société de Chirurgie de Bordeaux et du Sud-Ouest, June 1947.

578. Periston 'Bayer.' Pharm. Zschr., 1948, 84: 22. Description of 'Polyvinylpyrrolidone,' a product of polymerization (synthetic colloid) - briefly called 'Kollidon.'

579. Poullain, P., and Piette, M. Détermination de la masse sanguine par la polyvinylpyrrolidone. Bull. Soc. chim. biol., Par., 1948, 30: 496-500. The authors recommend and describe a method using pvp for measuring the blood volume. Pvp is nontoxic; no elimination takes place during the experiment. Results are reliable and easily obtained by colorimetry. 4 references.

580. Reppe, W. Acetylone as the basis of new plastics. Mod. Plastics, 1946, 23: No. 6, 169-172; 218-220. Polyvinylpyrrolidone: p. 176.

581. Reppe, W., Krzikalla, H., Dornheim, O., and Sauerbier, R. N-Vinyl lactams. U. S. Pat. No. 2,317,804, April 27, 1943. (French Pat. No. 865,354; Ger. Pat. No. 744,414). Abstr.: Chem. Abstr., 1943, 37: 6057.

582. Reppe, W., Schuster, C., and Hartmann, A. Polymeric N-Vinyl lactams and process of producing same. U. S. Pat. No. 2,265,450, December 9, 1941. (French Pat. No. 865,428; Ger. Pat. No. 737,663 and 738,753).

583. Sachs, B. Zum Thema: 'Ueber eine wesentliche Verkürzung der Blutkörperchensenkungsreaktion für die Praxis.' [W. Heinen u. U. Kowatzky: Med. Klin., Berl., 1949, 16: 505. (No. 574 of this list)] Med. Klin., Berl., 1949, 44: 1577-1578. According to Sachs, the gain of time is meaningless when compared with the resulting likelihood of inexact findings. The article is followed by a 'Schlusswort' von Dr. med. W. Heinen und Dr. med. U. Kowatsky. The authors stress that their method leads to more exact diagnostic results.

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POLYVINYLPYRROLIDONE - CHEMISTRY (Continued)

584. Schildknecht, C. E., Zoss, A. O., and Grosser, F. Ionic polymerization of some vinyl compounds. Ind. Eng. Chem., 1949, 41: 2891-2896. Abstr.: Chem. Abstr., 1950, 44: 3739. 'Polymerization mechanisms for vinyl ethers are discussed and the ionic polymerizations of vinyl methyl ketone, N-vinylpyrrolidone, and N-vinylcarbazole are described.' (Chem. Abstr.).

585. Schubert, R., and Wiegandt, E. Vorsicht bei der Beurteilung der Blutsenkungsgeschwindigkeit nach Peristoninfusionen. Deut. med. Wschr., 1944, 70: 307-310. Clinical tests. Addition of Periston to citrated blood in vivo accelerated the BSR. After 250-500cm^3, the acceleration is considerable (up to 9 times) and invalidates the BSR as a diagnostic means for detection of complications.

586. *Schuster, C., Sauerbier, R., and Finkentscher, H. Polymerization of N-Vinyl lactams. U. S. Pat. No. 2,335,454, November 30, 1943. (French Pat. No. 879,293; Italian Pat. No. 385,519). Abstr.: Chem. Abstr., 1944, 38: 2770, q.v.

587. Thom, H. Erfahrungen mit der durch Kollidon beschleunigten Blutsenkung. Tuberkulosearzt, 1950, 4: 347-349. The acceleration of the blood sedimentation velocity by Kollidon yields results lacking in precision to such an extent that it cannot be used clinically. This is probably due to the large variation in the size of the Kollidon molecules. 1 reference.

588. *Weese, H., Hecht, G., and Reppe, W. [Preparation of solutions suitable for use as blood plasma substitutes.] Ger. Pat. of September 7, 1943. (Danish Pat. No. 61,379; French Pat. No. 956,535; Norwegian Pat. No. 66,319).

Wunderly, C., see No. 432.

589. Zipf, K. Quantitative Kollidonbestimmung in Harn und Blut (Peristonnachweis). Klin. Wschr., 1944, 23: 340. Methods are described for the determination of polyvinylpyrrolidon in blood and urine.

POLYVINYLPYRROLIDONE - EXPERIMENTATION

590. Ammon, R., and Müller, W. Der Einfluss hoher Peristongaben auf den Kaninchenorganismus unter besonderer Berücksichtigung der Speicherorgane. Deut. med. Wschr., 1949, 74: 465-467. Large doses of intravenous periston brought about changes in the spleen, lymph nodes, fat tissue, liver etc. of rabbits. These changes are comparable to those in lipoid storage diseases. 10 references.

591. Bargmann, W. Über Milzveränderungen nach Peristonzufuhr. Deut. med. Wschr., 1946, 71: 184-185. Abstr.: Chem.

POLYVINYLPYRROLIDONE - EXPERIMENTATION (Continued)

Zbl., 1947, 1: 441-442; Chem. Abstr., 1948, 42: 8963, q.v. Changes in the spleens of rat after intravenous 'Collidon' justify the suspicion that the spleen as well as other organs of the reticuloendothelial system are storing periston. 5 references.

592. Bargmann, W. Über Milzveränderungen nach Zufuhr des Blutflüssigkeitsersatzes Periston. Virchows Arch., 1947, 314: 162-166. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1380; Bull. Anal. CNRS, 1948, 9: pt. 2, 1061. Swelling and vacuolization of reticular cells 5 days after injection. 5 references.

593. Cuny, L., and Quivy, D. Influence nulle de la polyvinylpyrrolidone sur la vitesse d'élimination de l'héparine injectée chez le chien par voie veineuse. C. rend. Soc. biol., 1948, 142: 1399-1402. Paper presented at the Meeting of the Société de Biologie, November 1948.

594. Fresen. Versuche mit Kollidon verschiedener Teilchengrösse. Ärztl. Forschg., 1949, 3: 308. Periston infusions into rabbits and dogs in which Kollidon fractions of various sizes were used show that tissue changes are determined by dosage and length of time. Abstract of a paper presented at the 32nd Meeting of the Deutsche Gesellschaft für Pathologie at Kiel, June 1949.

595. *Güldenhaupt, G., and Weiler, H. Blutzuckeruntersuchungen nach intravenösen Peristongaben bei Pferd und Hund. Deut. tierärztl. Wschr., 1944, 52: 201-202.

596. Heilmeyer, L. Hungerschäden. Med. Klin., Berl., 1946, 41: 241-249. In hunger edema, Periston was used in experimentation regarding the oncotic pressure with surprising results.

Korth, J., see No. 12.

597. Lavedan, J. P. Action de l'association subtosan-hormone oestrogène sur la durée de l'oestrus chez la Souris castrée. C. rend. Soc. biol., 1948, 142: 1481-1482. Experiments on the specificity of the vehicle function of PVP. Paper presented at the Meeting of the Société de Biologie, December 1948.

598. Loubatières, A. L'injection de polyvinylpyrrolidone déclenche chez le chien un choc grave et prolongé. C. rend. Soc. biol., 1948, 142: 1340-1342. Abstr.: Bull. Anal. CNRS, 1949, 10: pt. 2, 1729. 4 references.

POLYVINYLPYRROLIDONE - EXPERIMENTATION (Continued)

599. Loubatières, A. Polyvinylpyrrolidone, substance-retard pour l'insuline et l'insuline-protamine-zinc; démonstration expérimentale chez le chien dépancréaté. Ann. endocr., Par., 1946, 7: 173-178. Experiments with pancreatectomized dogs cause the author to believe that protaminezinc-insulin plus pvp is the most effective retarded insulin. 10 references.

600. Maksic, D. Therapeutische Versuche mit Periston und Periston-K 'Bayer' bei akuter Hufrehe des Pferdes. Tierärztl. Umschau, 1947, 2: 186-187. Periston (3.5-4 percent Kollidon) and Periston-K 'Bayer' (7 percent Kollidon) were used successfully in 10 out of 11 cases of inflammatory hoof edema.

601. Müller, W. Speicherungsversuche mit Kollidon. Zbl. allg. Path., 1948, 84: 292-293. Abstr.: Klin. Wschr., 1948, 26: 223. Experimental studies on rabbits performed together with Ammon; changes were observed in liver, spleen, lymph nodes and other organs. Abstract of a paper presented at the Pathologentreffen in Düsseldorf, July 1947.

602. Müller, W. Zur pathologischen Anatomie der alimentären Intoxikation. Deut. med. Wschr., 1946, 71: 32. In connection with therapeutic considerations, experimental storage experiments with Periston (together with Ammon) were reported. Spleen and lymphnodes recalled the picture of genuine storage diseases while liver and bone marrow showed no important changes. Abstract of a paper presented at the Meeting of the Medizinische Gesellschaft Göttingen, August 1945.

603. Murat, M. Recherche et dosage de l'albumine urinaire en présence de P.V.P. (polyvinylpyrrolidone). Produits pharm., 1950, 5: 290-291. Methods of determining presence and quantity of albumen in urine are described. 2 references.

Nelson, A. A., and Lusky, L. M., see No. 164.

604. Pellerat, J., Maral, R., and Murat, M. Etude histologique des viscères de cobayes après injections massives de polyvinylpyrrolidone (Subtosan). Ther. Umschau, 1948, 4: 153-155. After 'Subtosan,' histological changes were observed in kidneys, liver, and lungs of the guinea pig. The chondriome, however, was not affected.

605. Pendl, E. Behandlung der Vergiftung durch nitrose Gase. Klin. Wschr., 1944, 23: 264-269. Experiments with cats

POLYVINYLPYRROLIDONE - EXPERIMENTATION (Continued)

demonstrate that colloidal blood substitutes are contra-indicated in poisoning by nitrous gases, particularly in the stage of increasing toxic pulmonary edema.

606. Quevauviller, A. L'élimination de la quinine injectée au lapin est ralentie par un 'véhicule-retard,' le subtosan. Rev. palud., Par., 1946, 4: 225-228. Abstr.: Chem. Abstr.: 1947, 41: 1763. 5 references.

607. Quevauviller, A. Le subtosan hypertonique prolonge, chez la souris, la durée de l'anesthésie intraveineuse à l'évipan. Anesthésie, Par., 1946-49, 6: 296-299. Abstr.: Presse méd., 1947, 55: 219. In the mouse, hypertonic subtosan almost doubles the duration of intravenous anesthesia; toxicity also increases, but to a lesser degree. Paper presented at the Société Française d'Anesthésie et d'Analgésie, January 1947. 4 references.

608. Quevauviller, A. Le subtosan ralentit, chez le lapin, l'élimination urinaire de la quinine, injectée par voie veineuse. Ann. pharm. fr., 1947, 5: 93-98. 5 references.

Riedel, G., and Zipf, K., see No. 529.

609. *Schmidt, G. Uber den Einfluss von Periston auf einige serologische Phaenomene in vitro. Zschr. Immunforsch., 1950, 107: 341.

610. Schubert, R. Aenderung des Tropismus durch Fremdvehikel (Kollidon) als Wirkungsprinzip bei der Serum- und Gewebswäsche. Schweiz. med. Wschr., 1950, 80: 140-142. Animal experiments on the vehicle functions of the polyvinylpyrrolidone constituent of periston. 20 references.

611. Schubert, R. Beeinflusst Kollidon allergische Reaktionen (Serumkrankheit)? Med. Klin., Berl., 1950, 45: 76-77. Animal experiments with Kollidon show that this preparation does not influence intracellular allergic reactions such as are present in serum disease. 16 references.

612. Schubert, R. Sanierung des Serums von nierenunfähigen Stoffen durch Kollidon verschiedener Teilchengrösse; Reihenversuche an Meerschweinchen mit Trypanrot. Deut. Zschr. Verdauungskr., 1950, 10: 79-86. Detoxication by enabling substances incapable of being excreted by the kidneys to pass through the kidneys by means of 'Kollidon.' 14 references.

POLYVINYLPYRROLIDONE - EXPERIMENTATION (Continued)

613. Schubert, R. Serumsanierung mit künstlichen Kolloiden; nicht nierenfähige Stoffe permeieren mit Kollidon die Niere. Deut. med. Wschr., 1949, 74: 1489-1491. It was possible to induce excretion of trypan red in the urine (as late as 10 days after intravenous administration) by infusing kollidon (3.5 percent ; 7 percent) in various doses. 15 references.

614. Schubert, R., and Werner, H. Serum- und Gewebssanierung durch Kollidon; Versuche am Kaninchen mit Diaminreinblau FF. Zschr. inn. Med., 1950, 5: 298-308. Animal experiments present insight into the action of Kollidon in vivo; its detoxicating effect is the main topic of discussion. 15 references.

615. Schubert, R., and Wiegandt, E. Wechselbeziehungen zwischen Serum, Periston und Kongorot. Klin. Wschr., 1946-47, 17-18: 273-276. Abstr.: Bull. Anal. CNRS, 1948, 9: pt.2, 1626. Congo red combined with periston is governed by the same 'dependency mechanism' ('Abhängigkeitsmechanismus') in vivo as congo red combined with serum protein. 10 references.

616. Schwiegk, H. Methode zur fortlaufenden Registrierung der Ödembildung am isolierten durchströmten Kaninchenohr. Klin. Wschr., 1944, 23: 337-339. Periston, saline, human and rabbit serum are used in these experiments. 4 references.

617. Völker, R. Die Dehydration des Hufödems durch Periston. Deut. tierärztl. Wschr., 1943, 51: 89-91. Experiments with the surviving horsefoot show that Periston is suitable for the prevention and therapy of edema. Periston 'K' has an even stronger effect. No toxicity was noted in administration to horses.

618. Völker, R., and Barke, A. Periston als Blutflüssigkeitsersatz für den Hund. Deut. tierärzt. Wschr., 1943, 51: 261-263. Periston is not suitable as an emergency blood substitute, but may be administered where pre-treatment is possible, e.g. in exsiccosis. 6 references.

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619. Abirached, I. A. Subtosan, um preparado que preenche uma necessidade. Rev. brasil. cirurg., 1949, 18: 607-608. Report of 9 cases in which Subtosan (3.5 percent aqueous solution of pvp) was used successfully in prevention of surgical shock.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

620. *Balabanoff, Joppich, Opitz, and Doxiades. [Periston.] Kinderärztl. Prax., 1943, 14: 226. Abstracts of papers presented at a Meeting of the Fachgruppe für Ärztliche Kinderheilkunde der Wiener Medizinischen Gesellschaft, February 1943.

621. Barfuss, F., and Eichler, O. Periston bei wiederholter Darreichung. Arch. exp. Path., Lpz., 1949, 206: 346-356. Abstr.: Med. Mschr., 1949, 3: 634. Animal experiments show that even large doses of Periston do not cause any permanent damage; therefore, the usual therapeutic doses may be safely administered to man. 16 references.

622. Battezzati, M. Il polivinilpirrolidone (Subtosan) quale succedaneo del plasma sanguigno nella terapia preventiva e curativa dello shock e dell'edema cerebrale. Boll. Soc. piemont. chir., 1948, 18: 99-109. Strong endorsement of pvp with particular stress on its use in neurosurgery. - Discussion (p. 104-109) includes comment by S. Brena on the use of pectin.

623. Battistoni, L. Impiego del polivinilpirrolidone (pvp) in clinica; azione del pvp sulla velocità di sedimentazione delle emazie. Riv. pat. clin., 1948, 3: No. 11, 1-7. While 'pvp' (Periston, Subtosan) always accelerated the BSR in vitro, results obtained in vivo vary according to the physico-chemical conditions of the blood. 2 references.

624. Battistoni, L. Impiego del polivinilpirrolidone in clinica; il pvp nella cura della emofilia. Riv. pat. clin., 1948, 3: No. 11, 8-14. 'The treatment of hemophilia with a 3.5 percent solution of pvp (Periston or Subtosan) offers the most efficient therapy.' 7 references.

625. Battistoni, L. Impiego del polivinilpirrolidone in clinica; il polivinilpirrolidone nelle anemie. Riv. pat. clin., 1949, 4: 91-105. Positive results in 4 cases of pernicious anemia and 1 case of anemia secondary to hemorrhage of duodenal ulcer. 11 references.

Boudreaux, J., see No. 549.

626. Boudreaux, J., Delouche, G., and Fourmestraux, J. P. de. Note sur l'emploi, dans le traitement du shock, des plasmas artificiels synthétiques. J. méd. chir., Par., 1945, 116: 123-133. Clinical use of polyvinylpyrrolidone solution ('subtosan,' 'solution 143 R.P.') in traumatic and hemorrhagic shock. 3 references.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

627. Bovet, D., Courvoisier, S., and Ducrot, R. Activité de la polyvinylpyrrolidone dans le choc traumatique expérimental et sur les accidents provoqués par certaines toxines microbiennes. C. rend. Acad. sc., 1947, 224: 70-72. Beneficial preventive and curative properties of pvp in traumatic shock are described; pvp also offered limited protection against the toxins of Cl. oedematiens and Cl. sordelli. 6 references.

628. Brehme, T. Mass deaths of infants; rôle of cross-infection. Lancet, Lond., 1948, 2: 604-607. In the treatment of epidemic diarrhoea, the author gave blood infusions as an adjuvant, 'eventually changing to "Periston," and saline plus the glucose either as a supplement or alternatively.' 20 references.

629. Brunner, C., and Iklé, A. Erfahrungen mit der Peridural-anästhesie in der Geburtshilfe. Schweiz. med. Wschr., 1950, 25: 651. Successful use of Anselmino's 'peridural plug' (containing Periston). 7 references.

630. Bürkle de la Camp. Blutersatzfragen. Zbl. Chir., 1949, 74: 58-61. Periston is recommended as the best non-hematogenous blood substitute; isotonic crystalloid salt solutions are too 'fugitive' in their effect. Abstract of a paper presented at the 98th Meeting of the Vereinigung Niederrheinisch-Westfälischer Chirurger, April 1948.

631. Camelin, Grégoire and Garnung. Les nouveaux traitements de la néphrose lipoidique. Bull. Soc. méd. mil. fr., 1947, 41: 191-195. '...The third method consists in the injection ... of a 20 to 25 percent solution of polyvinylpyrrolidone (subtosan 25). It has been used successfully by Ravault, Pellerat, Pont and Vignon in 2 cases.' Paper presented at the Meeting of the Société de Médecine Militaire Française, October 1947.

632. Cardona Mateo, L. Recientes avances en el tratamiento de las toxicosis del lactante. - Tratamiento con el periston. Acta pediat., Madr., 1944, 2: 127-133. Mainly a discussion of the work done by Dieckhoff and Künstler (Nos. 640, 641 of this list). 19 references.

633. Clerc, J. L. La polyvinylpyrrolidone ou Subtosan, dans le traitement des hémorragies. Ther. Umschau, 1947-48, 4: 149-153. General article including report of 22 cases of obstetrical and gynecological hemorrhage treated with subtosan. 3 references.

634. Cosar, C. Augmentation de l'action thérapeutique de la pénicilline dans diverses infections expérimentales de

POLYVINYLPYRROLIDONE - THERAPY (Continued)

la souris. C. rend. Soc. biol., 1945, 139: 388-391. Abstr.: Chem. Abstr., 1946, 40: 4797. Penicillin dissolved in 'hypertonic subtosan' (solvent SH) has a greater therapeutic effect in staphylococcic and pneumococcic infection.

Dérot, M., see No. 23.

635. Dérot, M., Tanret, P., Grivaux, M., and Lande, M. Le traitement de la néphrose lipoïdique et de certains oedèmes rénaux par les injections de polyvinylpyrrolidone. Etude clinique et physiopathologique. Bull. Soc. méd. hôp. Paris, 1947, 63: 1008-1011. Report of two cases treated successfully with concentrated solution of pvp (25 percent). 1 reference.

636. Dérot, P. T., and Hervy, C. Néphrite chronique hydropigène. Rétrécissement du colon. Action de la polyvinylpyrrolidone sur les oedèmes. Bull. Soc. méd. hôp. Paris, 1946, 62: 547-549. Report of one case in which, after a poorly tolerated attempt at raising the oncotic pressure by intravenous injection of preserved plasma, injections of 20 percent solution of pvp (Subtosan) ranging from 10-30cm^3 daily eliminated the edemata permanently.

637. Detlefsen, M. Chirurgische Komplikationen bei Fleckfieber und Typhus. Deut. Gesundhwes., 1946, 1: 111-115. Collapse after hemorrhages in typhus and typhoid fever is successfully treated by infusions of Periston and Homoseran. 15 references.

638. Dieckhoff, J. Zur Behandlung toxischer Krankheitszustände (Diphtherie-Scharlach-Ruhr) mit Periston. Arch. Kinderh., 1950, 139: 52-62. In 87 children with toxic diphtheria, in 9 children with dysentery and in 7 children with scarlet fever, periston proved effective in prevention and therapy of vascular collapse. - Metabolism studies with rabbits. 12 references.

639. Dieckhoff, J. Zur Pathogenese und Therapie toxischer Krankheitszustände. Mschr. Kinderh., 1950, 98: 63-66. Frequent infusions of large doses of Periston are recommended in cases of metabolic collapse due to toxic diphtheria, toxic dysentery and scarlet fever. Report of results; mechanism of action.

640. Dieckhoff, J., and Künstler, S. Zur Behandlung der alimentären Säuglingsintoxikation mit Periston. Deut. med. Wschr., 1943, 69: 589-591. Abstr.: Bull. Hyg., Lond.,

POLYVINYLPYRROLIDONE - THERAPY (Continued)

1944, 19: 176-177. In 23 cases, Periston caused quick disappearance of the toxic state, weight gain, and increased pulse volume; 'hemodynamic' and 'protoplasmatic' collapse were completely overcome. 12 references.

641. *Dieckhoff, J., and Künstler, S. Zur Behandlung der alimentären Säuglingsintoxikation mit Plasma und Periston. Mschr. Kinderh., 1944, 93: 48-68.

642. Dieckhoff, J., and Ludwig, H. J. Zur Behandlung des protoplasmatischen Kollapses mit Periston bei experimenteller Diphtherie-Intoxikation. Arch. Kinderh., 1949, 137: 160-167. Experiments with rabbits showed the value of Periston in arresting protoplasmatic collapse and, thereby, creating better chances for preservation of life. 8 references.

Dost, F. H., see No. 456.

643. Düttmann, G. Klinische Untersuchungen und Erfahrungen mit Periston. Deut. Militärarzt., 1944, 9: 320-323. 'Periston' is far superior to saline solutions due to its prolonged retention and physiological colloidosmotic pressure. In 230 cases, no toxic symptoms were observed. Combination of intravenous 'periston' and subcutaneous NaCl yielded particularly good results. 1 reference.

644. Fouquet, J., Siguier, F., and Gautheron, R. Néphrose lipoïdique a frigore. Effets de la méthode de Veyre et du subtosan. Bull. Soc. méd. hôp. Paris, 1947, 63: 334-338. Veyre's method (injections of solution of HCl) was followed up with 9 intravenous injections of hypertonic subtosan (25 percent). After the third injection, complete disappearance of residual edema.

645. Geissendorfer, H. Die Blutübertragung bei Verbrennungen. Chirurg, 1944, 16: 122-126. Periston in saline-dextrose solution is considered the best serum substitute in hemoconcentration due to burns. 23 references.

646. Grenier, J., Bocquin, R., and Flandre, J. La diurèse activée au cours des ictères; action des solutions de polyvinylpyrrolidone. Presse méd., 1950, 58: 246. Report of 10 cases treated exclusively with pvp.

647. *Hecht, G., Joppich, J., and Weese, H. Periston-Wirkung und -Nachweis bei exsiccatischen Säuglingen. Mschr. Kinderh., 1948, 96: 145.

648. *Heinen, W., Heinen, H., and Eisenreich, H. Uber die Plasmatherapie. Aerztl. Wschr., 1950, 28: 80.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

649. Heinen, W., and Karrasch, K. Über die Plasmatherapie. Aerztl. Wschr., 1948, 3: 641-644. A new method for preparation of plasma is described; it is based on addition of a Kollidon-citrate mixture during the collection of the blood and the acceleration of the sedimentation rate obtained thereby. 39 references.

650. *Heinen, W., Loosen, H., and Dohrmann, W. Über die Plasmatherapie. Aerztl. Wschr., 1950, 28: 509.

651. Heinen, W., Roeb, H., and Karrasch, K. Über die Plasmatherapie. Aerztl. Wschr., 1949, 4: 420-422. 25cm³ of a 12 percent solution of collidon and 3 percent of natrium citrate per 100cm³ of blood yield a plasma substitute which has been used successfully in some 500 cases. 7 references.

652. Joppich, G. Zur Behandlung des Wasserverlustes bei der Darmstörung des Säuglings. Mschr. Kinderh., 1943, 92: 28-33. Experimental use of periston in 75 cases (25ccm per kg of bodyweight, 1-2 times daily) was successful in 40 children, while the result was doubtful in 16; in 18, the treatment was unsuccessful (one case not evaluated). A note calls attention to Periston* as even more valuable. 7 references.

653. Klees, E. Erfahrungen mit 'Periston,' einen Blutflüssigkeitsersatz. Münch. med. Wschr., 1943, 90: 29-32. Abstr.: Zentr. Org. ges. Chir., 1943, 109: 295. Clinical experiences in 50 cases.

654. Konjetzny, G. G. Die Behandlung von Verbrennungen. Med. Welt, 1944, 5-6: 76-77. Tutofusin and periston are suggested to counteract the decrease of circulating plasma.

655. Lampert, H. Eine erfolgreiche unspezifische Behandlung des Fleckfiebers. Hippokrates, Stuttg., 1943, 14: 703-706. Circulatory collapse was treated successfully by infusion of colloidal solutions particularly of 500 to 700cm³ of Periston per dose, up to 1500cm³ daily.

656. Liebau, G. Beobachtungen bei Schock und Kollapszuständen. Münch. med. Wschr., 1942, 26: 577-582. General discussion; therapeutic suggestions include tutofusin and periston. 12 references.

657. Linneweh, F. Indikation und Wirkung von Blutersatzmitteln. Med. Klin., Berl., 1948, 43: 186-189. Abstr.: Bull. Anal. CNRS, 1949, 10: pt. 2, 1445. Comparison of blood plasma and peristone for pediatric use. 26 references.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

658. Loewe, H. Blutersatzmittel. Med. Klin., Berl., 1946, 7: 103-106. General review leading up to detailed discussion and recommendation of Periston. 3 references.

659. Löwen, C. H. Die schwere Verbrennung. Med. Klin., Berl., 1949, 44: 736-739. Detailed description of the use of periston in burns. 20 references.

660. Löwen, C. H. Schock und Kollaps; zur Pathogenese und Therapie des extrakardialen Kreislaufversagens bei chirurgischen Erkrankungen. Med. Klin., Berl., 1948, 43: 109-113. Initial treatment with Periston is stressed. 24 references.

661. Magendie, M. J. Acquisitions récentes en matière de transfusion sanguine. Ther. Umschau, 1947-48, 4: 56-58, 76-81. Abstr.: Excerpta med., Sect. 9, 1948, 2: 4934. See particularly p. 81, Les succédanés du plasma sanguin where pvp (Subtosan) is discussed.

Magendie, Servantie, Duplan, and Moulinier, see No. 577.

662. Mandow, G. A., and Stoneham, F. J. R. Plasmosan in the prevention and treatment of shock. Lancet, Lond., 1951, 1: 1099-1100. Report of 37 cases; 'haemodilution and anisocylosis were noted in a few cases from 2-4 days after the transfusion. There was no interference with wound healing except for the presence of a haematoma in a few cases.' Plasmosan is recommended for maintenance or restoration of blood pressure.

663. Mellons, O. Tratamento de choque pela polivinilpirrolidona. Rev. paul. med., 1950, 36: 91-100. Clinical experience with Subtosan. 17 references.

664. Merke. Kolloidale Lösung als Blutersatz? Schweiz. med. Wschr., 1943, 73: 515. Largely a report on the work of Hecht and Weese (No. 555 of this list).

665. Müller, C. Polyvinylpyrrolidon (Periston, Subtosen) als Blutersatz in der geburtshilflichen Praxis. Ther. Umschau, 1949, 4: 22-25. Subtosan was used successfully in 60 cases (including 34 obstetrical ones) for prophylaxis and treatment of shock and collapse. 28 references.

666. Müller, C. Schock und Kollaps in der Geburtshilfe. Deut. med. Wschr., 1949, 74: 689-694; 732-733. Detailed discussion of fluid replacement in shock, stressing the advantages of pvp (Kollidon, Periston, Subtosan) and Amigen (Mead Johnson & Co.). Infusion technique is described. 7 references.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

667. Müller, E. Allgemeine Chirurgie. In: Fiat Review, 1939-1946. p. 11-76. Surgery, general and special. Wiesb., 1948. Periston: p. 41-42. Bibliography: p.52-76.

668. Pelzer, L. Frühschock und Spätschock. Zbl. Chir., 1943, 70: 1039-1047. In 'early shock,' 10 percent solution of NaCl is suggested to reestablish ion-balance because of its osmotic properties, the specific chemical effect of the Na-ions, and the effect of the Cl ions in improving the hyper-alkalized metabolic state. In 'late shock,' periston is the fluid of choice.

669. Ravault, P., Pellerat, M., Pont, M., and Vignon, G. Essai d'un traitement de la néphrose lipoïdique par le Subtosan. Presse méd., 1947, 55: No. 66, 770. Report of 2 cases in which rapid effect on diuresis, edema and weight was obtained. Less pronounced action on the humoral syndrome. Abstract of a paper presented at the Meeting of the Société Médicale des Hôpitaux de Lyon, June 1947.

670. Rehn, E. Plasma-Infusion und Blutgruppen. Med. Klin., Berl., 1950, 45: 1324. Use of citrate - collidon mixture with a 3.5 percent collidon concentration is suggested for quick plasma preparation.

671. Ricard, A., Francillon, J., and Pellerat, J. Quelques remarques sur l'usage de solution 143 en chirurgie. Lyon chir., 1945, 40: 110-113. Solution 143 (Subtosan) has been employed successfully in treatment and prevention of shock.

Riehl, G., see No. 76.

672. Schrank, H. Chirurgische Erfahrungen bei einem Divisionsfeldlazarett während des Feldzuges gegen Sowjetrussland. Zbl. Chir., 1942, 69: 1596-1601. In cases where the loss of blood volume is the main factor, periston has been found to be very successful. See p. 1600.

673. *Schubert, R., and Fargel, H. Blutdruckverhältnisse nach Periston-Infusionen. Med. Zschr., 1944, 3: 96.

674. Schulz, E. Bluttransfusion und Blutersatzflüssigkeit im Kriege. Deut. med. Wschr., 1941, 67: 779-784. Abstr.: Bull. War M., Lond., 1942, 2: 301; Zbl. Chir., 1943, 70: 1353. Periston (formerly Haemodyn) is much more effective than physiological saline, Normosal and Tutofusin. 8 references.

675. Sérafino, X. (M. et Mme.). A propos du choix d'un liquide de perfusion dans la thérapeutique de réanimation.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

Marseille chir., 1950, 2: 555-568. A short discussion of Subtosan (pvp) on p. 563. This paper is an abstract of Reynier's thesis (Marseille, 1949) which was not available to us. 12 references.

676. Steinforth. Über die moderne Schockbehandlung bei Operationen. Zbl. Chir., 1950, 75: 574-575. Saline and dextrose solutions are rejected as blood substitutes; periston is recommended. Abstract of a paper presented at the Meeting of the Kölner Chirurgenvereinigung, July 1949.

677. Straube, A. Zum Problem der postoperativen Verwachsungsverhütung. Zbl. Chir., 1948, 73: 299-303. Use of kollidon (a polymerized pvp) in prevention of postoperative adhesions in neurosurgery.

678. Ströder, J., and Hockerts, T. Die Peristonbehandlung der toxischen Diphtherie des Kindes. Deut. med. Wschr., 1949, 74: 282. In extremely severe toxic diphtheria, a mortality of less than 20 percent (4 out of 21) was obtained by adding daily 10-15cm/kg of 3.5 percent periston intravenously to the usual therapy. 7 references.

679. Struppler, V. Beobachtungen an Bauchverletzten im Bewegungskrieg. Deut. Militärarzt, 1942, 7: 115-122. In serious abdominal injury with considerable blood loss, the administration of periston is used as standard therapy. 23 references.

680. *Tavernier, L., and Creyssel, J. [Interilio-abdominal dearticulation.] Lyon chir., 1945, 40: 100.

681. Tönnis, W. Schussverletzungen des Gehirns. Zbl. Neurochir., 1941, 6: 113-161. Use of periston in support of circulation (see particularly p. 122). No references.

682. Wahl, F. A. Erfahrungen und grundsätzliche Stellungnahme zur Frage des Flüssigkeitsersatzes bei akuten Blutverlusten. Deut. med. Wschr., 1948, 73: 400-402. A discussion of various types of blood loss leads to the general conclusion that periston therapy is preferable to isotonic solutions (tutofusin, sterofundin). 8 references.

683. Weese, H. Blutersatzmittel. Pharmazie, 1948, 3: 337-340. Review article. Iso-oncotic or hyper-oncotic colloidal solutions are the only true 'blood substitutes.' 37 references.

POLYVINYLPYRROLIDONE - THERAPY (Continued)

684. Weese, H. Blutersatzprobleme. Deut. med. Wschr., 1947, 72: 555. Mainly on Periston. Lecture presented before the Verein der Ärzte Düsseldorfs, October 1946. - Discussion by Randerath.

685. *Weese, H. Blutersatzprobleme. Med. Zschr., 1944, 1: 19.

686. Wildegans, H. Blutersatz- und Bluttransfusionfragen. Med. Mschr., 1947, 1: 329-333. Abstr.: Bull. Anal. CNRS, 1949, 10: pt. 2, 671. Serum, plasma and periston are well suited to perform the hemodynamic task of a relatively permanent restoration of a normal quantity of circulating fluid; they are not able, however, to take over all functions of the blood lost. Each one of these colloidal fluids has its own indication.

687. Willenegger, H., and Brütsch, H. Klinischer Beitrag zur Wirkung des Plasmaersatzes Periston. Helvet. chir. acta, 1945, 12: 296-307. Clinically, 'the action of Periston is very near to that of plasma and .. superior to the action of isotonic saline.'

688. Winkler, A. W., Danowski, T. S., and Elkinton, J. R. The rôle of colloid and of saline in the treatment of shock. J. Clin. Invest., 1946, 25: 220-225. 'Colloid-containing solutions can exert a beneficial effect on the circulation in salt-depletion shock clearly beyond that due to the sodium chloride which they contain...' 24 references.

POLYVINYLPYRROLIDONE - TOXICITY, see also POLYVINYLPYRROLIDONE - EXPERIMENTATION

Ammon, R., see No. 36.

689. Ammon, R., and Braunschmidt, G. Das Schicksal des Peristons im Organismus. Biochem. Zschr., 1949, 319: 370-377. Abstr.: Chem. Abstr., 1949, 43: 8539. Dogs retain ca. 50 percent of infused kollidon while the other half is quickly eliminated by the kidneys. The retained kollidon is stored in spleen and lymph nodes where it causes histological changes. Some properties and reactions of kollidon are discussed. 15 references.

690. *Fresen, O. Versuche mit Kollidon verschiedener Teilchengrösse. Verh. Deut. path. Ges., 1949, 33: 126.

691. Korth, J., and Heinlein, H. Funktionelle und morphologische Untersuchungen über die Wirkung kolloidaler Blutersatzmittel unter besonderer Beachtung des Peristons. Arch. klin. Chir., 1943-44, 205: 230-232. Abstr.: Bull.

POLYVINYLPYRROLIDONE - TOXICITY (Continued)

War M., Lond., 1944, 5: 121-122. Thorough morphologic studies made in 9 dogs and 3 humans did not yield any indication that Periston or Periston 3.5 causes untoward tissue reactions or injury to any organs.

692. Langeron, L., Paget, M., Nolf, V., and Duriez, L. De l'influence de l'injection intra-veineuse de poly-vinyl-pyrrolidone en solution à 25% sur le fonctionnement rénal. Ann. biol. clin., Par., 1949, 7: 221-225. In 8 normal women, injections of 20cm of a 25 percent pvp solution caused a reduction of glomerular filtration, possibly due to increased osmotic pressure. 2 references.

693. Schoen, H. Organveränderungen beim Säugling nach Zufuhr von Periston. Klin. Wschr., 1949, 27: 463-468. The administration of periston to infants leads to morphological changes in the Kupffer cells and to storage phenomena in liver, spleen, lymph nodes and lungs. No damage of the parenchyma could be demonstrated. 7 references.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION

Anselmino, K. J., see No. 313.

694. Anselmino, K. J., Dahn, H., Gross, R., Jacobs, R., Plaskuda, G., Sauer, H., and Stewens, R. Eine neue Methode der kompletten Leitungsanästhesie des Geburtsschmerzes; die gezielte, protrahierte, peridurale Plombe. Geburtsh. & Frauenh., 1950, 10: 589-596. 'The use of new high molecular and highly viscous kollidons makes it possible to narrow the segmental area down to 3-4 segments, and at the same time to increase duration of the anesthesia to 6 to 8 or even 10 and more hours.' Lecture presented before the London University Postgraduate Medical School, March 1940.

695. Anselmino, K. J., Plaskuda, G., and Stewens, R. Über ein neues Verfahren der protrahierten Leitungsanästhesie des Wehenschmerzes; die segmentäre peridurale Plombe. Klin. Wschr., 1949, 27: 104-105. Report of 100 cases in which the authors successfully tried to improve on the segmentary peridural anesthesia as practiced in Germany (9-10cm^3 solution of 6 percent periston, 5 per mill pantocain) by raising the periston concentration, by replacing pantocain with percain, and by decreasing the quantity of liquid used (3-4cm^3 of concentrated kollidon-percain solution of high viscosity plus adrenalin). 4 references.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

696. Anselmino, K. J., and Stewens, R. Über die Ausschaltung des Wehenschmerzes durch Leitungsanästhesie des lumbalen Sympathikus. Geburtsh. & Frauenh., 1950, 10: 198-205. This method - abandoned by the authors in 1947 in favor of peridural anesthesia - had the disadvantage of short duration of the anesthesia (1 to 1-1/2 hours); prolongation by addition of kollidon (average 3 hours) entails a considerable factor of uncertainty as the duration of the birth cannot be predetermined.

697. Barbellion and Siboulet. Traitement de la blennorragie par la pénicilline-retard. J. urol. méd., Par., 1946-47, 53: 376-377. Abstr.: Presse méd., 1947, 55: 482. Pvp was used as a retardant in 46 cases of acute gonorrhea which were treated with one injection of 100,000 units of penicillin dissolved in 20cm^3 of 30 percent solution of pvp. 41 recoveries were obtained, while 3 cases required two additional injections at 7 hours' intervals and the remaining cases responded to sulfonamide therapy. Abstract of a paper presented before the Société Française d'Urologie, March 1947.

698. Battistoni, L., and Zanotelli, F. Utilizzazione delle soluzioni concentrate di polivinilpirrolidone come veicolo-ritardo dell'eliminazione dei farmaci. Polivinipirrolidone e insulina. Riv. pat. clin., 1949, 4: 144-162. 25 percent solution of polyvinylpyrrolidone prolongs the hypoglycemic effect of insulin. 40 references.

Bennhold, H., Ott, H., and Wiech, M., see No. 417.

699. Bennhold, H., and Schubert, R. Über die Plasmaähnlichkeit des Periston. Klin. Wschr., 1944, 23: 30-31. Periston has the genuine 'embatic effect' of serum protein, i.e. it accelerates (or even makes possible) the diffusion of coarsely dispersed dyes; it also possesses some of the properties of globulin.

700. Bennhold, H., and Schubert, R. Untersuchungen über die Möglichkeit einer Vehikelfunktion des Plasmaersatzstoffes Periston. Zschr. ges. exp. Med., 1943-44, 113: 722-736. In vitro experiments show that Periston is capable to combine with many substances found in blood, including lactoflavin. While this is a necessary condition for the 'vehicle function' it is not, by itself, sufficient and further experimentation is necessary. 13 references.

701. Camelin, A., and Magerand, F. Applications cliniques de la solution de polyvinylpyrrolidone à 25% (d'après un

emploi hospitalier de deux années et demie). Sem. hôp. Paris, 1949, 25: 1246-1247. Prolonged effect of penicillin in 19 cases of bacterial endocarditis and of salicylates in 60 cases of Bouilland's disease was achieved by association with PVP. 25 references.

702. Charlier, R. Renforcement et prolongation de l'action pneumodilatatrice de l'aleudrine et de l'adrénaline en aérosols, chez l'homme sain, par la polyvinylpyrrolidone. Arch. internat. pharm. dyn., Par., 1948, 77: 337-340. 12.5 percent pvp has a reinforcing and prolonging effect on the pneumodilating action of aleudrine and adrenaline aerosols in normal subjects. It may, therefore, be considered for use in preparing an aerosol with retarded action. 3 references.

703. Charlier, R., and Philippot, E. Modifications pharmacologiques du volume pulmonaire chez l'homme sain. Arch. internat. pharm. dyn., Par., 1949, 78: 559-581. See particularly chapter 9: Renforcement et prolongation de l'action pneumodilatatrice de quatre amines par la polyvinylpyrrolidone. Pvp used as retardant in a 12.5 percent aqueous solution strengthens and prolongs the pneumodilator action of aleudrine, adrenaline, adrianol and dibenzylmethylamine. These results obtained in healthy subjects justify its application as retardant in asthmatics together with dibenzylmathylamine as pneumodilator. Clinical experiments have confirmed these conclusions. 27 references.

704. Chavannaz, J., and Chabbert, Y. Les bases biologiques de la 'pénicilline-retard.' Mém. Acad. chir., Par., 1947, 73: 583-584. On the use of 'Subtosan 25' as retardant.

705. Chavannaz, J., and Léger, H. La pénicilline-retard. Mém. Acad. chir., Par., 1947, 73: 573-575.

706. Choay, A., and Choay, H. Prolongation des effets de l'insuline par association à la polyvinylpyrrolidone. Ann. pharm. fr., 1947, 5: 420-429. 9 references.

707. Choffel, C., and Amourdruz, J. P. Le traitement de la maladie de Raynaud. Médecin fr., 1947, 7: 227-229. Another application of 'novocaine retard' (i.e. with Subtosan).

708. Claisse, R., and Choay, H. Traitement du diabète insipide par un extrait post-hypophysaire à action prolongée [hypophyse-subtosan.] Bull. Soc. méd. hôp. Paris, 1947, 63: 309-313. Report of one case in which one or two

weekly injections of extract of the posterior lobe of the pituitary combined with 30 percent solution of subtosan were sufficient for maintenance.

Denecke, and Schneider, see No. 314.

709. Düttmann, G. Die peridurale, segmentäre Anästhesie. Zbl. Chir., 1941, 68: 530-535. Periston-pantocain anesthesia was used successfully by the author.

710. Durel, P. Les solutions concentrées de polyvinyl pyrrolidone; leur utilisation comme véhicule-retard. Rev. gén. clin. thér., 1948, 62: 273-278; 288-290; 295-296. A concentrated (25 percent) solution of pvp was used as solvent of various hydrosoluble substances with the idea of retaining them longer in the organism. Laboratory and clinical experiments proved a remarkable increase in the duration of the effect of insulin, various hormones, penicillin, anesthetics and sedatives, sulfur salicylate, antihistamins and numerous other substances. This result is obtained even when the substance is administered orally, while the pvp is given intravenously. Bibliography: p. 295-296.

711. Durel, P., and Dubost, P. Insulin preparations. U. S. Pat. No. 2,474,729, June 28, 1949. Quoted in: General Aniline & Film Corporation, New York, N. Y., PVP ... an annotated bibliography. New York, 1951. p. 161.

712. Durel, P., and Dubost, P. Sur une nouvelle insuline-retard. Bull. Soc. méd. hôp. Paris, 1945, 61: 193-196. Abstract of a paper presented at the Meeting of the Société Médicale des Hôpitaux de Paris, May 1945.

713. Durel, P., and Laroux, P. Sur un nouveau véhicule-retard pour les médicaments. Gaz. méd. France, 1946, 53: 151-154. Pvp may be used as a retardant in the administration of insulin, novocaine and penicillin; less frequent injections, smaller dosage and prolonged effect can be obtained. 9 references.

714. Durel, P., Ratner, V., and Siboulet, A. La pénicilline retardée par la polyvinylpyrrolidone. Ann. derm. syph., Par., 1947, 7: 22-24. Metabolism studies. Results in gonorrhea and syphilis. Abstract of a paper presented at the Meeting of the Société de Dermatologie et de Syphiligraphie, January 1947. 6 references.

715. Durel, P., Ratner, V., and Siboulet, A. L'emploi de la pénicilline retard dans la blennorragie. Ann. derm.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

syphil., 1946, 8. sér., 6: 780-782. Successful use of subtosan as a retardant. 5 references.

716. Fabre, L. A., and Mayacos, D. Note sur le passage transplacentaire de la pénicilline; applications thérapeutiques. Bull. Acad. méd., Par., 1949, 133: 240-243. Abstr.: Chem. Abstr., 1949, 43: 5500. Effect of administration of various types of penicillin in 23 women; penicillin-subtosan was used in three cases. Abstract of a paper presented at a Meeting of the Académie Nationale de Médecine, May 1949.

717. Galimard, J. E. Salicylate et polyvinylpyrrolidone. Ann. pharm. fr., 1947, 5: 429-435. Injection of 6g of 25 percent pvp solution daily brings about only a slight increase in salicylemia, amounting to not more than 20 percent - insufficient to omit even one injection of salicylate. 3 references.

718. *Gaté, J., and Pellerat, J. La pénicilline dans le traitement de la syphilis et de la blennoragie. J. méd. Lyon, 1946, 27: 585.

719. Gaté, J., and Pellerat, J. L'association pénicilline-subtosan (P.S.) dans le traitement de la blennorragie masculine. Ann. derm. syph., Par., 1946, 6: 706-707. Better results with 100,000 units of Penicillin per 10cm^3 of Subtosan. Abstract of a paper presented at the Meeting of the Société de Dermatologie et de Syphiligraphie, Lyon, November 1946.

720. Gaté, J., and Pellerat, J. L'association pénicilline-subtosan dans le traitement de la syphilis récente. Ann. derm. syph., Par., 1946, 6: 707. Abstract of a paper presented at the Meeting of the Société de Dermatologie et de Syphiligraphie, Lyon, November 1946.

721. Goepel, H. Die Periduralanästhesie mit Blutplombe. Zbl. Chir., 1950, 75: 308-314. Abstr.: Münch. med. Wschr., 1950, 92: 151; Chem. Zbl., 1950, 2: 669; Excerpta med., Sect. 9, 1950, 4: 1284. 'Peridural anesthesia can be limited to some 8 segments around the site of injection when using the pantocaine-periston plug (Hoechst), while an aqueous solution gives an extention over double this range. A substitute for periston is found by using a few ml. of the patient's blood in a solution containing 0.7 percent pantocaine, adrenaline and distilled water.' (Excerpta med.).

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

722. Goepel, H. Erfahrungsbericht über die Periduralanästhesie. Die Pantocain-Periston-Plombe zur segmentaren Anästhesie. Zbl. Chir., 1947, 72: 467-473. A standard procedure for pantocain-periston anesthesia is described for use in segmentary anesthesia of the upper and lower abdomen. 1800 cases.

723. *Greeff, K. B. Bericht über mehr als 1000 Periduralanästhesien bei gynäkologischen Operationen. Zbl. Gyn., 1950, 72: 354-361. Abstr.: Zentr. Org. ges. Chir., 1951, 119: 103. Report of 1038 cases in which the periston plug with 5 per mill pantocain was used.

724. Grossiord, A., and Lestradet, H. Myasthénie d'Erb-Goldflamm. Intérêt thérapeutique d'une 'prostigmine-retard.' Rev. neur., Par., 1946, 78: 599-601. Report of one case in which 1cm^3 of 40 percent hypertonic solution of pvp prolonged the action of prostigmine (1cm^3) considerably. 5 references.

725. Harvier, P., Di Mattéo, J., Deuil, R., and Choay, H. Essais cliniques comparés de l'insuline ordinaire, de l'insuline-zinc-protamine et d'une insuline associée au subtosan. Paris méd., 1947, 134: 57-62. Insulin-subtosan is claimed to be superior to I. Z. P. 5 references.

726. Harvier, P., and Perrault, M. La thérapeutique en 1947. Paris méd., 1947, 134: 597-607. See particularly p. 606-607: Le Subtosan hypertonique, à 25 percent; véhicule retard efficace. 66 references.

727. Hueber, W. Erfahrungen über die Periduralanästhesie. Zbl. Chir., 1942, 69: 5-8. Objections are raised to Düttmanns recommendation of using periston in peridural anesthesia (No. 709 of this list).

728. *Improvement in and relating to penicillin. Rhône-Poulenc. British Pat. Application 7691/46, March 12, 1946. Quoted in: General Aniline & Film Corporation, New York, N. Y., PVP ... an annotated bibliography. New York, 1951. p. 162.

Janot, M. M., see No. 316.

Krönke, E., see No. 318.

729. Lacomme, Fabre, A., and Mayacos, D. Note sur le passage transplacentaire de la pénicilline. Applications thérapeutiques. Bull. Acad. méd., Par., 1949, 133: 240-243.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

The addition of subtosan delays the passage of penicillin into the placenta as well as its disappearance; it makes it possible to obtain a fetal penicillemia as high as 4/5 of the penicellemia obtained in the mother.

730. Lambling, A., and Soullard, J. L'anesthésie-retard du sphincter dans le traitement des fissures anales. Arch. mal. app. digest., Par., 1946, 35: 258-260. Abstr.: Presse méd., 1946, 54: 670. in 50 cases, where injections of 0.1g of scurocaine and 5cm³ of 20 percent Subtosan solution (solution 143R.P.) were administered, retarding action equal to that of oil was obtained while the side effects of oil injections were avoided. Paper presented at the Meeting of the Société de Gastro-Entérologie de Paris, July 1946.

731. Landes, G. Stellatum-Anästhesie in der Sprechstunde. Münch. med. Wschr., 1950, 92: 312. Discusses the use of 10-20cm³ of 1 percent novocain solution in Periston (without adrenalin) for anesthesia by injection into the stellate ganglion.

732. Lauber, H. J., and Schmidt-Alexewitz, R. Untersuchungen über die Wirkung der örtlichen Betäubung mit Peristonzusatz. Klin. Wschr., 1950, 28: 98-99. Anesthesia induced by a 2 percent novocain-3.5 percent periston solution takes effect later and lasts longer. Postoperative pain is reduced. 9 references.

733. Laugier, P. La pénicilline retard dans le traitement de la blennorragie. France méd., 1947, 10: 8-9. On the basis of 39 cases treated with penicillin in oil and 11 cases treated with 25 percent subtosan-penicillin, the author prefers oil because its application is simpler and because no preparation and no special preservation methods are needed. 11 references.

734. Lecoq, R. Essai de traitement des abcès tuberculeux thoraciques par l'association pénicilline-acide para-aminobenzoïque-polyvinylpyrrolidone. Thérapie, Par., 1948, 3: 62-64. 'Activation' of small penicillin doses by association with p-aminobenzoic acid and polyvinylpyrrolidone; report on 4 cases of sternal abscess of tubercular origin. 5 references.

735. Lederer, J. Association du polyvinyl-pyrrolidone à la pituitrine, dans le traitement du diabète insipide. Acta endocr., Kharkov, 1949, 2: 307-316. In three cases 'the addition of polyvinyl-pyrrolidone to posterior lobe extracts (pituitrin)' proved to be 'a valuable improvement in the treatment of diabetes insipidus.' 2 references.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

736. Leger, L. L'utilisation de solution retard pour la rachianesthésie. Presse méd., 1947, 55: 58. A mixture of 1/1,500 percaine with subtosan in the proportion of two to one was used to reinforce the effect of procaine and prolong its action. The mixture seems to help in preventing postanesthetic headache.

737. Le Loutre. Pénicillotherapie et subtosan dans le traitement de la blennorragie. Maroc méd., 1948, 27: 3-5. 20 percent Subtosan retards the elimination of penicillin; for treatment of gonorrhea 200,000 O.U. with Subtosan given in 4 injections every 8 hours are generally sufficient.

738. *Léonard, M. Pénicilline-sang. Traitement retard de la blennorragie. J. méd. Bordeaux, 1948, 125: 222-223. Use of blood or Subtosan as retardants.

739. Lestrade, de. Essai de traitement de blennorragies aiguës par pénicilline-retard. Bull. Soc. méd. mil. fr., 1947, 41: 169-172. Two series of 25 cases each successfully treated with penicillin in hypertonic subtosan (20 percent pvptyrode solution). Discussion (Camelin) p. 171-172.

740. Levrat, M., Pellerat, J., Garde, A., Favre-Gilly, J., and Cotte, J. Essai d'une nouvelle insuline-retard; l'insuline-subtosan. J. méd. Lyon, 1947, 28: 449-460. The effects of ordinary insulin are not noticeably modified by combination with subtosan. In moderately serious and serious cases of diabetes, one daily injection may take the place of two. Insulin-Subtosan has, therefore, the same advantages as protamine-zinc insulin and is more easily prepared. Further experimentation is necessary before a definitive statement can be made. 6 references.

741. Levrat, M., Pellerat, J., Moindrot, R., and Murat, M. Applications thérapeutiques de l'insuline-subtosan chez le diabétique. Bull. Soc. méd. hôp. Paris, 1945, 61: 196-198. Report of 2 cases stressing the fact that Subtosan, besides its retarding properties, exhibits a protective physiochemical effect and a biochemical action of neutralizing proteolytic ferments capable of destroying insulin. Paper presented at the Meeting of the Société Médicale des Hôpitaux de Paris, May 1945.

742. Levrat, M., Pellerat, J., Moindrot, R., and Murat, M. Une nouvelle insuline-retard; l'insuline-subtosan (étude chez l'homme normal et chez le diabétique). Bull. Soc.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

méd. hôp. Paris, 1945, 61: 198-200. Paper presented at the Meeting of the Société Médicale des Hôpitaux de Paris, May 1945.

743. Lian, C., and Bergamo, G. Le tétraéthylbromure d'ammonium dans le traitement de l'angine de poitrine, des artérites oblitérantes et de la maladie de Raynaud. Bull. Soc. méd. hôp. Paris, 1948, 64: 244-251. Due to shortage of Subtosan, TEA-Subtosan was used only in one case of angina pectoris where three previous TEA treatments had been unsuccessful; the favorable results of the treatment still persisted 20 days later. 7 references.

744. Lian, C., and Bergamo, G. Le tétraéthylbromure d'ammonium dans le traitement de l'hypertension artérielle permanente. Bull. Soc. méd. hôp. Paris, 1948, 64: 239-244. TEA (10 percent)-Subtosan - (25 percent) administered intramuscularly yields better clinical results than TEA alone; in 80 percent of the cases, lower tension was obtained which persisted for one or more months in 40 percent.

745. Lian, C., Siguier, F., Piette, Poulain and Sarrazin. La thrombine-retard comme traitement de fond de l'hémophilie. Bull. Acad. méd., Par., 1947, 3. sér., 131: 512-513. Case report.

746. *Manstein, B., and Kan, G. Bedeutet die Periduralanästhesie einen Fortschritt für die operative Gynäkologie? Eine kritische Untersuchung. Zbl. Gyn., 1950, 72: 361-371. Abstr.: Zentr. Org. ges Chir., 1951, 119: 103. Report of 1500 cases; the use of 2 ampoules is suggested of which the first one contains 10cm^3 of 3 percent 'Kollidon' solution while the second one contains 10cm^3 of 10 per mill pantocain solution plus 6gtt. of suprarenin.

747. Maral, R. Contribution à l'étude du dosage de la pénicilline dans le sang et des substances retard en pénicillino-thérapie. Lyon, 1947. Thesis-Lyon. See particularly chapter 3, The various retarding methods suggested (p. 27-34) and chapter 4, Results obtained with pvp (20 and 25 percent) and Romansky-Rittman's mixture (p. 43-54). Bibliography: p. 63-66. 58 references.

748. Marmont, A., and Palmieri, A., Jr. Prolungamento dell'azione eparinica mediante associazione con polivinilpirrolidone ipertonico. Boll. Soc. biol. sper., 1949, 25: 1341-1343. In 10 normal subjects, a hypertonic 25 percent solution of pvp (Subtosan) prolonged and increased the anticoagulant action of heparin as well as its effect on the bleeding time. 17 references.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

749. Mascré, M. Actions retard de la polyvinylpyrrolidone (P.V.P.) sur quelques organes végétaux. Ann. pharm. fr., 1950, 8: 388-391. Pvp effects a combination with dissolved substances, thus retarding or preventing their penetration into the cell; it also combines with water making it unavailable for the plant at certain concentrations. 1 reference.

750. Meidinger, F. Etude des relations entre la durée d'action des anesthésiques locaux et la viscosité du solvant (scurocaïne et subtosan (véhicule-retard)). C. rend. Soc. biol., 1943, 139: 907-908. Abstr.: Chem. Abstr., 1946, 40: 6654. While prolonged anesthesia may be obtained in the guinea pig by addition of a 20 percent subtosan solution, a very considerable prolongation follows the administration of scurocaine in 40 percent subtosan solution. 2 references.

751. Meidinger, F. La polyvinylpyrrolidone (P.V.P.) colloïde protecteur de synthèse in vitro et in vivo (phénomène de colloïdophylaxie). Bull. Soc. chim. biol., Par., 1947, 29: 411-416. Pvp (Subtosan) offers protection 1) in vitro (silver index), almost equal to gelatin. Polyvinyl alcohol does not offer any protection. 2) In vivo: Complete protection of mice against congo red poisoning; polyvinyl alcohol offers no such protection. This protective action both in vitro and in vivo, undoubtedly plays an important part in its physiological function as plasma substitute. 3 references.

752. Mennenga. Erfahrungen mit der Periduralanästhesie. Deut. Gesundhwes., 1949, 4: 362. 91 cases of abdominal surgery in which a perÏston-pantocain solution (according to Goepel) was used for peridural anesthesia. Abstract of a paper presented at the Meeting of the Medizinisch-Wissenschaftliche Gesellschaft für Chirurgie an der Universität Rostock, December 1948.

753. Pages, F., and Mansour, M. Traitement ambulatoire de la blennorragie par la pénicilline subtosan et la pénicilline G. retard. Bull. Soc. méd. mil. fr., 1947, 41: 195-198. In 15 cases of acute gonorrhea 3 i.m. injections within 24 hours of 100,000 units of penicillin dissolved in 10cm^3 of hypertonic subtosan (20 or 25 percent) led to 13 cures. Similar results were obtained, however, with a suspension of penicillin G sodium in oil and wax. Paper presented at the Meeting of the Société de Médecine Militaire Française, October 1947.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

754. Pellerat, J., and Murat, M. Etude pharmacodynamique chez l'homme d'une solution de polyvinylpyrrolidone employée comme véhicule-retard; asscciation avec le salicylate de sodium, les extraits cortico-surrénaux, la pénicilline. Thérapie, Par., 1947, 2: 49-60. Discussion of the retarding action of pvp and its mechanism. 15 references.

755. Perrault, M. Le Subtosan à 25%, véhicule retard efficace. Hôpital, 1947, 35: 167-168. Short review article. 2 references.

756. Perrault, M., and Rousseau, P. Subtosan hypertonique et neptal. Progr. méd., Par., 1947, 75: 323-324. A review of the literature on the use of subtosan as retardant is followed by a report of 10 cases of successful application of 20 percent pvp solution associated with neptal (a mercurial diuretic) in 10 cases of severe systole with subacute pulmonary edema and dyspnea. 20 references.

757. Pundel, P. Traitement anticoagulant par l'héparine 'retard.' Presse méd., 1949, 57: 1120-1121. While no case reports are given detailed rules for dosage, administration, etc. of 'Heparin-Subtosan' are presented. 17 references.

758. Rousset, J. Emploi d'un véhicule-retard pour la pénicillino-thérapie de la blennorragie. Ann. derm. syph., Par., 1946, 6: 709-710. Also in: Lyon méd., 1947, 3: 42. Report on several cases where 10cm³ of a 20 percent solution of subtosan were administered together with every 100,000 units of penicillin. Paper presented at the Meeting of the Société de Dermatologie et de Syphiligraphie, Lyon, November 1946.

759. Roux, M., Jacquot, G., and Huguenard, P. L'anesthésie-retard au pentothal-subtosan. Presse méd., 1947, 55: 778-779. Report of 100 cases confirming the harmlessness and excellence of the method.

760. *Schmidt-Alexewitz, R. Untersuchungen über die Wirkung der örtlichen Betäubung mit Periston-Zusatz. Marburg, 1946. Inaug.-Diss.

761. Schubert, R. A new means of detoxicating the body by replacing the bile-liver system by the kidneys as organs of excretion of substances bound to artificial colloids. Rev. Gastroenter., N. Y., 1950, 17: 165-179. Collidon (the colloidal component of Periston) being a vehicle different in character from blood proteins 'has the

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

capacity of inducing dyes bound to albumins and normally dispatched to the liver to go to the kidneys, thence to be secreted.' Experiments with guinea pigs. 11 references.

762. Schubert, R. Erklärungsmöglichkeiten des Mechanismus bei der Serum- und Zellsanierung mit Kollidon. Ärztl. Forschg., 1950, 4: 42-46. 'Kollidon, a polyvinylpyrrolidon, can bind a great number of substances scarcely or not at all eliminable through the kidneys and, being itself eliminable, can pass them through the kidneys (serum cleaning)...' 16 references.

763. Schubert, R. Können nichtnierenfähige Stoffe durch Bindung an künstliche nierenfähige Kolloide über die Nieren zur Ausscheidung gebracht werden? I. Mitteilung-Versuche mit Trypanrot-M bei intravenöser Kolloidgabe. Zschr. klin. Med., 1949, 145: 608-636. A coarsely dispersed dye which as such is unable to pass the gallbladder or the kidney may be enabled by combination with i.v. kollidon to pass the kidneys. This principle opens up new therapeutic possibilities.

764. Schubert, R. Können nichtnierenfähige Stoffe durch Bindung an künstliche nierenfähige Kolloide über die Nieren zur Ausscheidung gebracht werden? II. Mitteilung-Versuche mit Trypanrot-M bei intraperitonealer und subcutaner Kolloidgabe. Zschr. klin. Med., 1949, 145: 637-647. In this second part of his experiments, the collidon solutions were administered intraperitoneally and subcutaneously, in consideration of the hemodynamic load which, in some cases, may be heavy. 20 references.

765. Schubert, R. Neue Wege der Entgiftung durch Infusion niedermolekularer Kollidonfraktionen. Deut. med. Wschr., 1948, 43-44: 551. Abstr.: Deut. Gesundhwes., 1949, 4: 363. A preliminary report. - Kollidon, a component of periston, combines with blood globulin; this combination is dissolved in the kidney whereupon kollidon is secreted. It is possible to combine dyes that are capable of combining with protein, with kollidon and, in this way enable them to be excreted in the urine. The same is true of botulinus, diphtheria and tetanus toxins, and also of certain viruses like the tobacco mosaic virus and the polyeder virus.

766. Schubert, R. Serum- und Gewebswäsche mit künstlichen Kolloiden; Möglichkeiten eines neuartigen Therapieprinzips. Deut. ges. inn. Med., 1949, 55: 303-309. 'Detoxication' therapy based on the hydrophilia of

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

'Kollidon' combined with the fact that it is secreted by the kidneys within a few hours. 14 references.

767. Schubert, R. Über die quantitative Ausscheidung von niedermolekularem Kollidon (Periston). Neue med. Welt., 1950, 3: 78-80. Periston is excreted by way of the kidneys in accordance with the particle size of the collidon. Substances that cannot be excreted through gallbladder or kidneys, may be excreted through the kidneys by combining them with collidon. Substances capable of being eliminated selectively through the gallbladder lose their primary tropism when combined with collidon and are excreted by way of the kidneys. 5 references.

Schubert, R., see No. 16.

768. Schubert, R., and Graser, V. Wird die Sulfonamidausscheidung durch intravenöse niedermolekulare Kollidoninfusionen beeinflusst. Arch. inn. med., 1950, 1: 515-536. There is no certain proof of any change in sulfonamide excretion after the simultaneous massive infusion of 3.5 percent low molecule kollidon. 18 references.

769. Sédallian, P. A propos du traitement des infections bactériennes par la pénicilline administrée à de longs intervalles. J. méd. Lyon, 1949, 5: 575-579. The author severely restricts the indications of 'penicillin-subtosan.' Case reports. 10 references.

770. Sédallian, P., Pellerat, J., Moinecourt, J., and Maral, P. Association de la polyvinylpyrrolidone et de la cortine de synthèse dans le traitement des diphtéries malignes. Presse méd., 1947, 55: 58-59. Polyvinylpyrrolidone in concentrated solution of 20 percent (Istosan) delays the elimination of synthetic DCA and, thereby, prolongs its effect in acute suprarenal insufficiency due to diphtheria. 5 references.

771. Sèze, S. de, Ordonneau, P., and Deuil, R. Note préliminaire sur l'emploi en rhumatologie de la novocaine associée à la polyvinylpyrrolidone en solution concentrée. Rev. rhumat., Par., 1947, 14: 138-139. 5cm^3 injections of 2 percent novocaine in a 20 percent pvp solution in 7 cases were well tolerated and prolonged the effect from 2-8 times while intolerance reactions were reduced and delayed. 3 references.

772. Siboulet, A. Traitement du prurit anal par les injections souscutanées locales de novocaïne-subtosan. Ann. derm.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

syph., Par., 1947, 7: 387-388. Report of 48 cases resistant to other treatment; 19 were cured while 28 were improved.

773. Siguier, F., Giudicelli, R., and Walter, C. Intérêt d'un véhicule retard en thérapeutique opiacée. Progr. méd., Par., 1948, 76: 223-224. While the tolerance for opium-pvp is about the same as for standard solutions, opium-pvp (20 percent) prolongs the analgesic effects of morphium and opium. The daily required dose (and thereby, the danger of addiction) is reduced. 7 references.

774. Simon, K. Novocaininfiltration des Ganglion stellatum mit Kollidon als Depotsubstanz. Deut. med. Wschr., 1949, 74: 746. In 50 cases, 7-10cm^3 of a 2 percent novocain solution with 15 percent kollidon prolonged the anesthesia to an average of 6 hours without any side effects.

775. Soulairac, A., and Barbizet, J. Utilisation des substances s'opposant à la diffusion dans les injections intracérébrales d'anesthésiques. C. rend. Soc. biol., 1947, 141: 463-465. A mixture of 1 percent novocain and 5 percent Subtosan shows prolonged anesthetic effect and is well tolerated. 1 reference.

776. Starlinger. Über Depotanästhesie. Zbl. Chir., 1943, 70: 1728. Use of 3.5 percent periston solution is effective in prolonging local novocain anesthesia and in promoting increased blood supply of considerable duration. Abstract of a paper presented at the 65th Meeting of the Deutsche Gesellschaft für Chirurgie, October 1943. Original unavailable.

777. Stübinger, G. Die Periduralanästhesie in der inneren Medizin. Deut. med. Wschr., 1949, 74: 972-975. Routine use of periston in peridural anesthesia. 19 references.

778. Stutinsky, F. Action des extraits hypophysaires associés au 'subtosan' sur la réaction de Brunn chez le crapaud. C. rend. Soc. biol., 1947, 141: 477-482. Addition of 30 percent Subtosan prolongs and increases the antidiuretic effect of weak hormonal solutions.

779. Tiffeneau, R., and Singuier. J. Aérosol-retard. Bull. Acad. méd., Par., 1947, 3. sér., 131: 697-698. 3.5 percent pvp (Subtosan) was added to pulverized solutions in 500 inhalations administered to 50 asthmatics. 50 percent of the patients benefited by prolongation and reinforcement of the local bronchoalveolar effects. No side effects. 2 references.

POLYVINYLPYRROLIDONE - VEHICLE FUNCTION (Continued)

780. Truc, Daude, and Schilliro. Traitement de la blennorragie masculine par le 'pénicilline-retard' et étude comparative avec la 'pénicillino-thérapie' classique. Presse méd., 1947, 55: 669. 90 percent of the cases treated responded to 2 injections of 200,000 O.U. of penicillin each, suspended in 10cm³ of 25 percent solution of Subtosan (pvp). Abstract of a paper presented at the Société des Sciences Médicales et Biologiques de Montpellier et du Languedoc Méditerranéen, May 1947.

781. Vignon. Syphilis intolérante au novar et au bismuth traitée par la pénicilline-subtosan. Lyon méd., 1947, 177: 67. Successful therapy with two daily injections. Presented at the Meeting of the Filiale Lyonnaise of the Société Française de Dermatologie et de Syphiligraphie, November 1946.

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Feigen, G. A., see No. 275 (GELATIN - THERAPY).

Foâ, C., see No. 468 (PLASMA SUBSTITUTES).

Gibson, S. T., see No. 472 (PLASMA SUBSTITUTES).

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Koop, C. E., see No. 489 (PLASMA SUBSTITUTES).

Koop, C. E., see No. 490 (PLASMA SUBSTITUTES).

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SHEEP SERUM, see ANIMAL SERUM

SHOCK (selected background material). For use of plasma substitutes in shock, see PLASMA SUBSTITUTES or name of substitute, e.g. DEXTRAN, GELATIN, etc.

783. Allen, F. M. Shock. Clin. Med., 1946, 53: 353-355. Abstr.: Excerpta med., Sect. 9, 1948, 2: 322-323. A new theory of the mechanism of shock is the basis for the author's suggestion of physiologic saline therapy rather than use of plasma.

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shock in war. The methods of Stern, Asratjan, Selcovsky, Fjodorov and Petrov are reviewed.

Binet, L. R., see No. 324.

788. Binet, L. R. Des sérums artificiels à la transfusion sanguine; la notion du sang dilué. Gaz. hôp., 1940, 113: 637-642. Abstr.: Zbl. Chir., 1943, 70: 220. A solution of 8g of NaCl, 1-1/2g of $NaHCO_3$ and 4g of sodium hyposulfite in 1 liter of water, alone or with whole blood, is suggested for treatment of hemorrhage and shock. 5 references.

789. Blixenkrone-Møller, N. Shock og Vaedskeproblemer, set i amerikansk Belysning. Nord. med., 1948, 37: 615-620. Abstr.: Excerpta med., Sect. 9, 1948, 2: 1229; Nord med., 1948, 38: 902-903.

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791. Creyssel, J., and Suire, P. Choc traumatique; étude clinique, physiopathologie et thérapeutique. 2d ed. 340 p. Paris, Masson, 1949. Bibliography: p. 307-327.

792. Crossman, L. W., and Allen, F. M. Shock and refrigeration. J. Am. M. Ass., 1946, 130: 185-189. 'Experimentation during the past six years has revolutionized the treatment of shock by substituting temperature reduction for the previous practice of warming, and replacing the former colloid or plasma concept with fluid therapy chiefly in the form of large volumes of salt solution.' 46 references.

793. Darrow, D. C., and Engel, F. L. Liver water and electrolytes in hemorrhagic shock. Am. J. Physiol., 1945, 145: 32-37. Rat experiments. 12 references.

794. Davis, H. A. Shock and allied forms of failure of the circulation. 595 p. New York, Grune and Stratton, 1949. Bibliographies at chapter endings.

795. Dubois-Ferrière, H. La maladie post-opératoire et le shock traumatique. 372 p. Lausanne, Roth, 1945.

Duesberg, R., see No. 458.

796. Duesberg, R., and Schroeder, W. Pathophysiologie und Klinik der Kollapszustände. 94 p. Leipzig, Hirzel, 1944. Bibliographical footnotes.

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797. Dunphy, J. E. Shock; a consideration of its nature and treatment. Brit. J. Surg., 1944-45, 32: 66-74. '...No adequate substitute for blood and plasma in the treatment of severe haematogenic shock...' 32 references.

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of existing therapeutic technics applied only to the irreversible stage of shock; (3) an inquiry into certain phases of intermediary metabolism in shock; and (4) observations on the effect of viviperfusion of the liver during hemorrhagic shock.' 28 references.

803. Garrett, V. O problema do 'shock' cirúrgico; orientaçao terapéutica. Amatus Lusitanus, Lisb., 1945, 4: 731-751. See particularly p. 737-738 where saline and dextrose are discussed.

Glasser, O., and Page, I. H., see No. 344.

804. Gosset, J. Sur le choc traumatique. Lyon chir., 1944, 39: 295-303. Considerations on the mechanism of shock. 20 references.

805. Green, H. D. Basis for therapy in shock. North Carolina M. J., 1947, 8: 228-235. 'In the absence of blood or plasma, saline may be used. Although it will ultimately diffuse into the tissues, it helps temporarily to prevent capillary stasis and maintain cardiac output. Alkalinizing solutions such as sodium bicarbonate and sodium lactate have been recommended, but their effectiveness has not been fully proven...'

806. Harkins, H. H. Recent advances in the study and management of traumatic shock. Surgery, 1941, 9: 231-294; 447-482; 607-655. See particularly chapter VI, Therapy of shock, p. 464-479. 848 references.

807. Henstell, H. H., and Gunther, L. Studies of plasma volume in the human being;comparative results of reduction of plasma volume, intramuscular pressure and venous pressure in surgical shock. Am. J. M. Sc., 1945, 209: 187-199. 'Peripheral circulatory failure in surgical shock may be evident with a normal and unchanged plasma volume. A decrease in plasma volume up to 590cc. is not necessarily followed by peripheral circulatory failure... The kinetics of the peripheral circulation as related to intramuscular pressure (the venopressor mechanism) and other forces that may constitute the venous pump in man, are worthy of greater attention in investigations of the problem of shock; these studies must be made on the human being, preferably, rather than on other animals.' 25 references.

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811. Kohlstaedt, K. G., and Page, I. H. Terminal hemorrhagic shock; circulatory dynamics, recognition, and treatment. Surgery, 1944, 16: 430-465. 13 references.

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812. Lewy. Le traitement du shock. Bull. internat. Serv. santé, Liége, 1944, 14-17: No. 12, 8-15. Includes short discussion of saline and glucose.

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815. Mimet, P. R. Physio-pathologie du chock traumatique; recherche de bases cliniques et anatomiques. 366 p. Niart, 1942. Thèse-Bordeaux. Bibliography: p. 349-363.

816. Moia, B. Insuficiencia circulatoria periférica: Colapso, shock. 80 p. Buenos Aires, El Ateneo, 1942.

817. Moore, F. D. Blood and tissue volume changes during shock. 8 p. No. 8 in: U. S. Army Medical Service Graduate School. Symposium on shock. 7-9 May 1951.

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Processed. 'The supportive effects of whole blood are remarkably superior to any other solution we have, not because of oxygen or carbon dioxide transport of pH effects, helpful though these may be, but because of the space occupying function of the red blood cell, a result wholly of its particle size and shape.'

Müller, C., see No. 666.

818. Mylon, E., Winternitz, M. C., Katzenstein, R., and de Sütö-Nagy, G. J. Studies on mechanisms involved in shock. Am. J. Physiol., 1942, 137: 280-298. 'Studies on mechanism are presented associated with fall in blood pressure, relative red cell volume and plasma protein content following intravenous injection of thromboplastic substance, histamine, and release of an arterial occluding tourniquet on the hind legs of dogs... Preliminary depletion of tissue potassium in all three groups is without influence on the blood pressure changes; it does reduce the rise in red cell volume and the loss of plasma protein.' 17 references.

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Infection. - Thermal burns. - Crush or compression syndrome. - Anesthesia in shock. - 3 appendices: Reconstitution and administration of serum. - Technical aids to the intravenous administration of fluids to the shocked patient. - Reactions caused by intravenous infusions.

822. Necheles, H. Physiology of shock and of blood substitutes. N. York State J. M., 1943, 43: 1601-1606. Largely a discussion of the mechanism of shock, particularly after burns. 32 references.

Oliveira, E. de, see No. 527.

Page, I. H., see No. 361.

Pelzer, L., see No. 668.

823. Piulachs Oliva, P. Shock traumático. 165 p. Barcelona, Salvat, 1945. Bibliography: p. 147-165.

824. Ricard and Fanjeaux. La réanimation-transfusion au cours des offensives d'Italie du 11 mai on 27 juillet 1944. Bull. internat. Serv. santé, Liège, 1946, 19: 7-22; 51-65; 94-112. Good general article on shock and transfusion.

Rungs, H. M., see No. 328.

825. Sayers, M. A., Sayers, G., and Long, C. N. H. The standardization of hemorrhagic shock in the rat; observations on the effects of transfusions of whole blood and some blood substitutes. Am. J. Physiol., 1946, 147: 155-164. Important for exposition of factors determining standard bleeding procedures. 'Blood substitutes' discussed are limited to solutions of sodium chloride and sodium succinate. 20 references.

826. Schöneberg, G. Kollaps; Richtlinien für die Praxis: Mit einem Beitrag: 'Der Kollaps in der Chirurgie,' von G. Maurer. 88 p. Dresden, Steinkopff, 1942. Bibliography: p. 77-78.

827. Schwiegk, H. Shock und Kollaps; funktionelle Pathologie und Therapie. Klin. Wschr., 1942, 21: 741-749; 765-770. Clinical picture of shock and collapse. - Pathogenesis of shock and collapse. - Hemorrhagic collapse. - Collapse due to failure of the central nervous system. - Traumatic shock. - Burn collapse. - Circulatory collapse due to freezing - due to exsiccosis in infectious diseases. Definition of shock and collapse. - Therapy of shock and collapse. Approximately 130 references.

SHOCK (Continued)

828. Scudder, J. Shock; blood studies as a guide to therapy. 315 p. Philadelphia, Lippincott, 1940. Bibliography: p. 237-269.

829. Sérafino, X. A propos des conceptions élargies du choc. La notion de shock local. Rev. chir., Par., 1950, 69: 55-64. Abstr.: Excerpta med., Sect. 9, 1951, 5: 905.

830. U. S. Army Medical Service Graduate School. Symposium on shock; sponsored jointly by the Division of Medical Sciences of the National Research Council and the Army Medical Service Graduate School, Army Medical Center. Washington, The School, 1951. Processed. Contains many valuable papers; the ones most important for this bibliography have been listed separately.

831. Weil, P. G., and Meakins, J. C. Shock and its treatment. Clinics, 1942, 1: 59-67. Review article with short discussion of saline. 25 references.

Weston, R. E., Janota, M., Levinson, S. O., and Necheles, H., see No. 330.

832. Wiggers, C. J. Physiology of shock. 459 p. New York, Commonwealth, 1950. The shock problem. - Clinical shock. - The criteria of experimental shock. - Production of experimental shock. - Experimental hemorrhagic shock. - Newer methods for studying the hemodynamics of shock. - Standardized oligemic and normovolemic shock. - The hemodynamics of oligemic and normovolemic shock. - The mechanisms of peripheral circulatory failure. - The heart in shock. - Respiratory and oxidative functions in shock. - Metabolic disturbances in shock. - Toxemic and neurogenic factors. - The involvement of special organs in shock. - Summary of sequential reactions in the development of shock. Bibliographies at end of each chapter.

833. Wiggers, C. J. The present status of the shock problem. Physiol. Rev., 1942, 22: 74-123. An excellent review. 269 references.

834. Wiggers, C. J. Recent studies on the irreversibility characteristic of shock. Exp. M. & S., 1943, 1: 2-13. 20 references.

SUBTOSAN, see POLYVINYLPYRROLIDONE

JAPANESE CONTRIBUTIONS

835. Huzii, S. Syosyu sikketu-hokyū-eki tyūnyū ga seitai ni oyobosu zikken-teki kenyū hoi. [Ergänzung zur experimentellen Untersuchung über den Einfluss der verschiedenartigen Blutersatzflüssigkeiten auf den Organismus.] Kyoto huritu ikadaigaku zassi, 1943, 37: 579-617. 67 references.

836. Iwanaga, N., Hame, M., and Nagami, H. A substitute for blood serum. Jap. Pat. No. 177,464, January 19, 1949. Abstr.: Chem. Abstr., 1951, 45: 5370, q.v.

837. Murakami, S. Kyū-sei sikketu-zi ni okeru yuketu daisyō-eki ni kan-suru kenkyū. [A study on solutions which may be substituted for the blood in transfusions for treatment of acute hemorrhage.] Kaigun Gunikai Zassi, Tokyo, 1940. 29: 147-178. 'For the substitution for blood to be transfused for the treatment, the following solutions were prepared: (a) for intravenous injection, 1.8-2.5 percent NaCl + 5 percent glucose + 0.05 percent KCl + 1.5 percent gelatin + a small amount of Ca; (b) for intravenous injection the same as (a) except that 6 percent gum arabic was substituted for gelatin; (c) for subcutaneous injection, the same as (a) with the exclusion of Ca. Of these (a) and (b) were both found to be satisfactory, and (c) was less satisfactory, but superior to the physiological saline solution...' 109 references.

838. Ueno, K. Artificial blood consisting mainly of calcium starch sulfate. Jap. Pat. No. 177,162, December 20, 1948. Abstr.: Chem. Abstr., 1951, 45: 5370, q.v.

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839. Asratyan, E. A. Ocherki po etiologii, patologii, i terapii travmaticheskovo shoka. [Outline of the etiology, pathology and therapy of traumatic shock.] 173 p. Moskva, Medgiz, 1945.

840. Bagdasarov, A. A. Konservierung des Blutes und Blutersatzmittel. Deut. Gesundhwes., 1946, 1: 527-528. Report on Russian research and practice, including discussion of the 'colloid-infusion' prepared by Lisitsin, Fyodorov and Vassilev the colloidal component of which is casein.

841. Bagdasarov, A. A., and Kasanski, V. I. Problema primeneniya krovozameshchayushchikh zhidkostei. [The problem of application of blood substitutes.] Sovr. probl. gematol., 1944, 19: 23-39. Historical introduction. -

RUSSIAN CONTRIBUTIONS (Continued)

Requirements to be met by blood substitutes. - Soviet blood substitutes: 1. Hematogenous. 2. Salt solutions. 3. Colloid solution. 4. Special antishock solutions.

842. Bashinskaya, O. A. Sravitelnoe izuchenie Leuconostoc mesenterioides i Leuconostoc agglutinans. [Comparative studies on Leuconostoc mesenterioides and Leuconostoc agglutinans.] Microbiology, Moskva, 1940, 9: 444-452. Abstr.: Chem. Abstr., 1941, 35: 4057. 'The microorganism Leuconostoc agglutinans, capable of agglutinating yeasts, is a stable mutation variety - of Leuconostoc mesenterioides... Distinguishing signs of Leuconostoc agglutinans are: the size of the colonies, the absence of sharply defined capsules, a somewhat lowered ability for acid formation than Leuconostoc mesenterioides and ability to clay yeast cells into clumps. Leuconostoc agglutinans preserves its ability to agglutinate yeasts when cultivated upon all liquid and solid media. Leuconostoc agglutinans produced slime from sucrose. In this case the slime - enveloped culture does not clay yeasts. The presence of capsules may be observed with specially stained preparations under the microscope.'

843. Borisenko-Vitlash, I. M. Krovozameshchayushchii rastvor Popova i perelivanie krovi pri travmaticheskom shoke i obeskrovlivanii (Predbaritelnow soobshchenie). [Popov's blood substitute solution and blood transfusion in traumatic shock and hemorrhage; preliminary communication.] Khirurgia, Moskva, 1946, No. 7, 25-32. Wartime experiences. 84 cases: 44 infusions of Popov's blood substitute, 30 blood transfusions, 10 saline infusions.

844. Chursina, T. F., and Leontiev, I. F. Krov i ee substituty. [The blood and its substitutes.] Usp. sovrem. biol., 1945, 19: 189-218. A detailed review article. Some 35 references.

845. Drew, C. R. The role of Soviet investigators in the development of the blood bank. Am. Rev. Soviet M., 1943-44, 1: 360-369. A review article, with particular stress on use of cadaver and placental blood. 47 references.

846. Fedorov, N. A. New albumin blood substitutes. Brit. M. J., 1946, 2: 987-988. 'In our work at the Blood Transfusion Institute (U.S.S.R.) we have made use of a solution for intravenous transfusion which we call "colloidal infusion"; it contains an albumin product obtained from the casein of cows' milk.' It is non-anaphylactogenic and non-toxic. 700 transfusions have been given so far.

RUSSIAN CONTRIBUTIONS (Continued)

847. Fedorov, N. A. New blood albumin substitutes. Am. Rev. Soviet M., 1946-47, 4: 243-249. See preceding reference.

848. *Fedorov, N. A., and Vasiliev, P. S. [Salt infusione C.I.B.T.] Sovr. probl. genatol., 1944, 19: 39-45.

849. Iokhveds, B. I. O vnutriserdechnom perelivanii krovi. [Intracardial blood transfusion.] Khirurgia, Moskva, 1944, 2: 76-78. Intracardial infusion of a physiologic solution of sodium chloride glucose and blood. 2 cases. Description of technique. English translation in Am. Rev. Soviet Med., 1945, 3: 116-119.

850. Kagan, B. O., Latker, Sh. N., and Zfasman, E. M. Fosforoliz sakharozy kulturami Leuconostoc mesenterioides. [Phosphorolysis of saccharide with Leuconostoc mesenterioides cultures.] Biokhimia, 1942, 7: 93-108. Abstr.: Chem. Abstr., 1943, 37: 4760. English summary. 24 references.

851. Kebrov, A. A., Urinson, A. P., Urinson, Y. P., and Dmitrieva, S. P. Klinicheskie nablyudeniia nad ranenymi v sostoyanii shoka. [Clinical observations on shock patients.] Klin. med. Moskva, 1947, 25: No. 4, 38-52. Abstr.: Excerpta med., Sect. 9, 1949, 3: 160.

852. Pavlenko, S. M. Perelivanie malykh kolichestv krovi sovmestno s bolshimi obemami fiziologicheskoi zhidkosti (kombinirovannaya gemotransfuziya) pri massivnikh, krovoizliyaniakh. [Transfusion of small quantities of blood together with large quantities of physiological solution (combined hemotransfusion) in massive hemorrhages. Khirurgia, Moskva, 1943, No. 4, 43-51. A. Disorders in the organism caused by massive hemorrhages. - B. Analysis of the method of combined hemotransfusion. - C. Our experimental data (physiological, hematological, pathological).

853. Petrov, I. R. Nekotorye soobrazheniya i vozrazheniya po povodu stati prof. S. M. Pavlenko 'perelivanie malykh kolichestv krovi sovmestno s bolshimi obemami fiziologicheskoi zhidkosti' (Khirurgiya, No. 4, 1943). [Some considerations and objections in connection with the article of Prof. S. M. Pavlenko, 'Transfusion of a small quantity of blood together with a large quantity of physiological solution' (Khirurgiya No. 4, 1943).] Khirurgia, Moskva, 1944, No. 1, 84-88.

854. Petrov, I. R., Veselkin, P. N., Dernoskaya, M. L., and Petkun, T. E. The comparative value of three blood

RUSSIAN CONTRIBUTIONS (Continued)

substitutes. Am. Rev. Soviet M., 1944, 1: 450-455. Discusses the therapeutic effects of Seltsovski's solution, Petrov's blood substitute, and Fedorov-Vasiliev's 'serotransfusione'. Use of Petrov's hypertonic saline solution with 10 percent blood is advocated. From Voenno-sanitarnoe delo 1943, No. 8-9: 5-13.

855. *Seltsovski, P. L. [The alcohol glucose salt solution, C.I.B.T.] Sovr. probl. gematol., 1944, 19: 74-77.

APPENDIX

ANIMAL SERUM

856. Cardús, J. Nuestra experiencia sobre las transfusiones de plasma sanguineo de ternera, en la practica tocoginecologica. Medicina, Madr., 1951, 19: 300-302. Based on over 100 cases, calf blood is recommended in obstetric and postoperative shock, particularly for use in rural hospitals. The author refers to an earlier paper (*Clínica y laboratorio, December 1949) in which he reported 21 cases.

DEXTRAN

857. Beck, W. Schock- und Kollapsbekämpfung mit Dextran, einem neuen Blutflüssigkeitsersatzmittel. Med. Welt., 1951, 20: 753-756. Report of 48 cases; dextran is highly recommended as an effective and non-toxic 'blood-substitute.' 13 references.

858. Brewer, D. B. Renal clearances of dextrans of varying molecular weights. Proc. R. Soc. M., Long., 1951, 44: 561-563. '...It appears that dextran is mainly excreted by glomerular filtration. If any tubular excretion or reabsorption occurs it is relatively small in amount... A striking feature of the results is the great effect of molecular size on the rate of movement of dextran across the glomerular membrane.' Rabbit experiments. Abstract of a paper presented before the Section of Experimental Medicine and Therapeutics, February 1951.

859. Grönwall, A. Erfahrungen mit einer kolloidalen Infusionslösung von Dextran (Macrodex). Deut. med. Wschr., 1951, 76: 1023-1027. General discussion; clinical experiences. Paper presented before the Vereinigung niederrheinisch-westfälischer Chirurgen, Bad Pyrmont, September 1950.

DEXTRAN (Continued)

860. Hardwicke, J. Use of dextran to study erythrocyte sedimentation. Proc. R. Soc. M., Lond., 1951, 44: 559-561. 'Results already obtained suggest that the separate determination of fibrinogen and serum factor concentrations, when compared with the ordinary methods of reporting erythrocyte sedimentation rates, is likely to give information of greater clinical value both in diagnosing and in following the progress of disease.' Abstract of a paper presented before the Section of Experimental Medicine and Therapeutics, February 1951. 3 references.

861. Jeanes, A., Wilham, C. A., and Miers, J. C. Preparation and characterization of dextran from Leuconostoc mesenteroides. J. Biol. Chem., 1948, 176: 603-615. 'A method has been established for the preparation of water-soluble dextran products of uniformly high viscosities and of high purity from cultures of Leuconostoc mesenteroides NRRL B-512 on an unbuffered, unaerated, sucrose medium... Purified dextrans which were isolated from culture media at their maximum viscosity were characterized by high viscosities; purified dextrans isolated from culture media after their maximum viscosity had been passed had lower viscosities.' 28 references.

862. Ricketts, C. R. Chemistry of dextran and its derivatives. Proc. R. Soc. M., Lond., 1951, 44: 558-559. Preparation and properties. - Estimation of molecular weight. - Dextran fractions for experimental use. - Dextran sulphate. Abstract of a paper presented before the Section of Experimental Medicine and Therapeutics, February 1951, 7 references.

863. Schmitz, H. Über das Schicksal des Macrodex im Organismus (Vorläufige Mitteilung). Klin. Wschr., 1951, 29: 424-425. Rat experiments. 'Animal tissue is capable of dehydrating Macrodex (Dextran), but this process does not affect the molecular size in the sense of depolymerization.' 5 references.

864. Squire, J. R. Background to biological studies with dextran. Proc. R. Soc. M., Lond., 1951, 44: 557-558. 'Some examples of fundamental problems which can be studied with dextran can be given. (1) The measurement of membrane permeabilities... (2) The reticuloendothelial system in normal animals... (3) Nature of antigen-antibody reactions... (4) Cell surfaces... (5) Blood-clotting mechanisms.' Abstract of a paper presented before the Section of Experimental Medicine and Therapeutics, February 1951. 1 reference.

DEXTRAN (Continued)

865. Vehniäinen, K. Eräs dekstraanilla hoidettu verensiirtokomplikaatiotapaus. Duodecim, Helsin., 1951, 67: 60-66. 'A case is reported in which transfusion of mismatched blood resulted in oliguria-hematuria and severe shock. The condition of shock was treated with repeated dextran infusions. When the symptoms of shock retreated, good diuresis occurred and the patient recovered.' 6 references.

866. Walton, K. Experiments with dextran sulphate as an anticoagulant. Proc. R. Soc. M., Lond., 1951, 44: 563-564. 'The sulphuric esters of dextrans of molecular weight less than 20,000 are free from the undesirable toxic effects of previously described sulphonated polysaccharides. One such compound is being submitted to clinical trials and, if found satisfactory, may serve as a synthetic analogue of heparin. It should be possible to produce this material at considerably lower cost than heparin.' Abstract of a paper presented before the Section of Experimental Medicine and Therapeutics, February 1951. 5 references.

867. Whiteside-Carlson, V., and Carlson, W. W. The vitamin requirements of leuconostoc for dextran synthesis. J. Bact., Balt., 1949, 58: 135-141. 'Acid production from glucose and fructose and both acid production and dextran yields from sucrose were determined for three strains of Leuconostoc in a chemically defined medium. Thiamine, nicotinic acid, and pantothenic acid were required by all strains, the need for folic acid and riboflavin varying with the different strains...' Biotin is apparently not essential. 23 references.

GELATIN

868. Hicks, R. G., and Collins, V. J. Experiences with intravenous gelatin. N. York State J. M., 1951, 51: 1819-1821. 'Clinical cases of hemorrhagic shock during anesthesia and surgery have been presented in which intravascular gelatin has been partially effective in restoring normal blood pressure. In one instance gelatin was used intra-arterially without complications. No untoward reactions were noted either during or after the administration of the gelatin... It should be given with caution to patients with cardiac impairment.' Presented at the 145th Annual Meeting of the Medical Society of the State of New York, Buffalo, Section on Anesthesiology, May 1951. 6 references.

GELATIN (Continued)

869. Jacobson, S. D., and Smyth, C. J. Gelatine as a substitute for plasma, observations on its administration to human beings. Arch. Int. M., 1944, 74: 254-257. Abstr.: Klin. Wschr., 1946, 24-25: 46; Biol. Abstr., Balt., 1945, 19: No. 2322. 'A 5 percent solution of ... bovine osseous gelatine was safely administered to 45 normal persons and to 50 patients in shock.'

870. Lesser, M. A. Newer uses for gelatin. Drug. & Cosmet. Indust., 1945, 56: 176-177; 260-263. Review article; includes discussion of gelatin as a plasma substitute and as a retardant. 42 references.

871. *Rossi, G., and Strocchi, P. M. [Electroviscometric effect in gelatin.] Ann. chim. appl., 1949, 39: 640-646. Abstr.: Chem. Abstr., 1951, 45: 7850.

872. Steigmann, F., Meyer, K. A., Kozoll, D. D., Volk, B. W., and Popper, H. Gelatin solution as a plasma substitute. Am. J. Clin. Path., 1945, 15: 223. Abstr.: Bull. Anal. CNRS, 1946, 7: pt. 2, 722.

873. Swingle, W. W., Kleinberg, W., and Hays, H. W. A study of gelatin and saline as plasma substitutes. Am. J. Physiol., 1944, 141: 329-337. Abstr.: Bull. Anal. CNRS, 1947, 8: pt. 2, 559. Intermittent gelatine infusions proved as effective as infusions of pooled heparinized plasma and more effective than saline in the prevention of death due to shock in dogs. 21 references.

874. Ward, A. G. Structure and properties of gelatin. Food, 1951, 20: 255-259. Abstr.: Chem. Abstr., 1951, 45: 8794. 7 references.

INFUSION THERAPY

875. *Campani, M. Sulla trasfusione endoarteriosa. Boll. mem. Soc. tosco-umbra. Chir., 1950, 11: 449-452. Abstr.: Excerpta med., Sect. 9, 1951, 5: 906-907. 'In 7 cases of surgical shock this brought rapid improvement, even when large intravenous infusions had failed. Experiments on rabbits proved that the nervous system plays an important part: section of the spinal cord at the level of Th12 prevents the rise of blood pressure when the injection is made into the femoral artery, but not when it is made into the carotid.' (Excerpta med.).

OKRA

876. Benjamin, H. B., Ihrig, H. K., and Roth, D. A. Preliminary report on okra extract as a plasma substitute. In press.

OKRA (Continued)

877. Benjamin, H. B., Ihrig, H. K., and Roth, D. A. The use of okra as a plasma replacement. Rev. canad. biol., 1951, 10: 215-221. Abstr.: Chem. Abstr., 1951, 45: 9805. Experimentation on 20 dogs in hemorrhagic shock shows their return to normal after transfusion of an aqueous solution of okra (Hibiscus esculentus). 19 references.

PECTIN

878. Deuel, H. Pektin, seine Reaktionen mit dem Blut, besonders die hämostatische Wirkung. Schweiz. med. Wschr., 1945, 75: 661-665. Short, but thorough review article. Some 85 references.

879. Kertesz, Z. I. Pectin as blood plasma substitute. In his: The pectin substances. New York, Interscience, 1951, p. 570-572. 'Further research ... is needed to decide whether the objections to such possible retention of pectin in the body are strong enough to counteract the benefits derived from its use. However, the fact that pectin solution is a suitable plasma substitute, or, more correctly, a replacement solution, is clearly established...' 17 references.

880. *Vollmert, B. Viscosity and degree of esterification of pectin solutions. Makromol. Chem., 1950, 5: 128-138. Abstr.: Chem. Abstr., 1951, 45: 7960.

881. *Volpicelli, M. Usefulness of pectin as retarding agent for absorption of penicillin. Boll. Soc. ital. biol. sper., 1950, 26: 1023-1025. Abstr.: Chem. Abstr., 1951, 45: 9809.

PLASMA

882. Warren, J. V., Merrill, A. J., and Stead, E. A., Jr. The rôle of the extracellular fluid in the maintenance of a normal plasma volume. J. Clin. Invest., 1943, 22: 635-641. 13 references.

PLASMA PROTEINS

883. Beattie, J., and Collard, H. B. Plasma protein concentration after heamorrhage. Brit. M. J., 1942, 2: 301-304. 9 references.

884. Bisceglie, V. Le proteine del plasma sanguigno. Rass. clin. sc., 1951, 27: 78-83. Review article considering the most important recent work including the work done by Cohn on plasma fractionation.

PLASMA SUBSTITUTES

885. Bradasch, G. A. Comparative value of various parenteral fluids. Anesthesiology, 1944, 5: 1-10. Abstr.: Chem. Abstr., 1944, 38: 2109; Bull. Anal. CNRS, 1947, 8: pt. 2, 788. Evaluation of crystalloids, gum acacia, bovine plasma, pectin, serum albumin plasma, and whole blood. 26 references.

886. Colloidal plasma substitutes. J. Am. M. Ass., 1944, 126: 1154-1155. Abstr.: Bull. Anal. CNRS, 1946, 7: pt. 2, 291. Editorial calling attention to the recent work of Locke (No. 503 of this list) and Roome (No. 551 of this list).

POLYVINYLPYRROLIDONE

887. Besse, J. H. Contribution à l'étude expérimentale du métabolisme de la polyvinylpyrrolidone; action des injections intraveineuses répétées de solutions concentrées de polyvinylpyrrolidone chez le lapin. Thérapie, Par., 1951, 6: 54-64. The findings obtained in rabbit experiments include storage phenomena in the muscle tissue, the lungs, the heart, the kidneys and the liver of a rabbit which had previously received two P.V.P. injections of 2.8g/kg and 3.5/kg respectively. 7 references.

888. Dulong de Rosnay, Ch., and Labadie, P. La détermination de la masse sanguine par la polyvinylpyrrolidone à 25%. J. méd. Bordeaux, 1951, 128: 224-230. Abstr.: Biol. Abstr., Balt., 1951, 25: No. 30210. A method is proposed which supposedly has the advantages a) of low cost and harmlessness of the substance used, b) speed, c) simple dosage, d) applicability in all cases, e) a margin of error limited to ± 5 percent. 2 references.

AUTHOR INDEX

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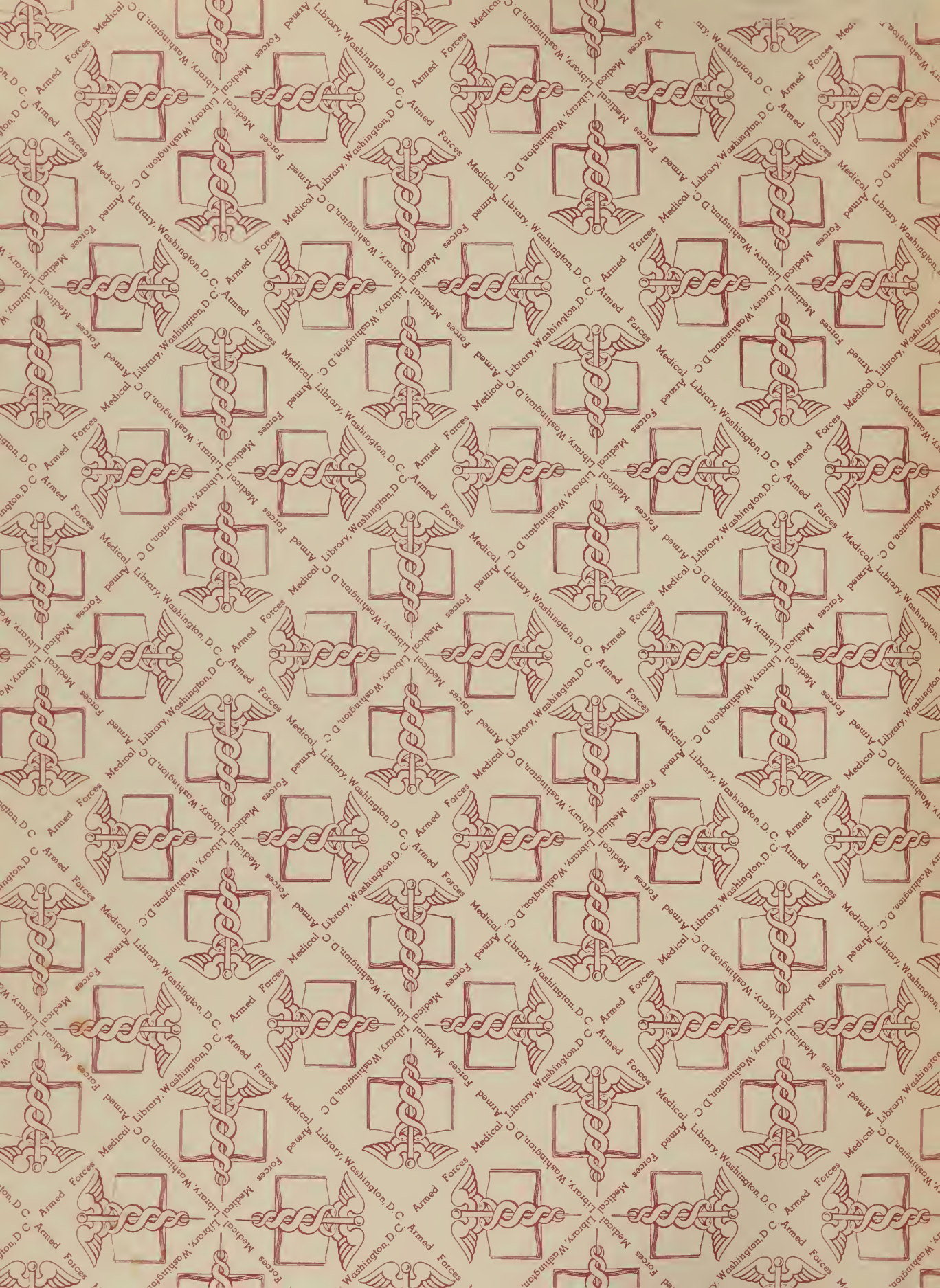
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